

***Data Quality Assessment  
Report for the  
Post-Decontamination  
Characterization of the  
Contents of Tank WM-180  
and Associated Ancillary  
Equipment at the Idaho  
Nuclear Technology and  
Engineering Center Tank  
Farm Facility***

*August 2005*



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Engineering Center Tank Farm Facility**

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## **ABSTRACT**

This report documents the assessment of the data collected during the cleaning of Tank WM-180 at the Idaho National Laboratory Idaho Nuclear Technology and Engineering Center Tank Farm Facility. The data assessed in this report were generated from the sample analysis of residual tank liquids remaining after decontamination. Because the volume of solids remaining in the tank was reduced to less than 15% by volume of the total sample collected following decontamination activities, the solids portion of the samples collected were not analyzed and compared with the action levels for regulated constituents. Data from the sample analysis of the liquids from the tank vault sump are analyzed in this document. The residual tank and sump liquids data are assessed to determine whether the concentrations of regulated constituents were reduced below the action levels necessary for clean closure. Radionuclide data are compared with an established inventory. The analysis shows all radionuclide activities are less than the inventory values modeled in the tank performance assessment. The analysis also shows that clean closure action levels are achieved for the chemical constituents in the tank. Based on the data analysis, decisions associated with these data can be made with a high degree of confidence.



## **FOREWORD**

Tank WM-180 is one of 15 tanks at the Idaho National Laboratory Idaho Nuclear Technology and Engineering Center Tank Farm Facility. The cleaning of Tank WM-180 was performed as part of the Resource Conservation and Recovery Act (RCRA) clean closure and U.S. Department of Energy (DOE) tank closure activities underway at the Idaho Nuclear Technology and Engineering Center Tank Farm Facility. The data were compared to three criteria:

- For RCRA clean closure, the data were assessed to determine whether the concentrations of RCRA-regulated constituents were reduced to levels below the action levels specified for clean closure in the *Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tank WM-180* (DOE-ID 2004). This analysis indicates clean closure action levels were not exceeded by liquid contaminants in Tank WM-180. Because the samples collected contained less than 15% solids by volume, the solids portion of the samples collected were not analyzed and compared with the action levels for regulated constituents.
- For DOE tank closure, the radionuclide data were compared with the radionuclide concentrations that were used in the *Performance Assessment for the Tank Farm Facility at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003). These values were based on sampling data and predicted values from the ORIGEN numerical model. This model is used to predict the radionuclides and relative values in waste streams. An inventory of radionuclides that remains in the tanks after decontamination was prepared for the performance assessment and is used in this document as an indicator of compliance with DOE radionuclide performance objectives.
- The data collected from sampling the post-decontamination, residual, liquid contents of Tank WM-180 and the vault sump were assessed against the criteria for data quality specified in the *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-180 Tank Residuals* (ICP 2004a).



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## **ACRONYMS**

AL	action level
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CV	coefficient of variation
<i>df</i>	degree of freedom
DQA	data quality assessment
DQO	data quality objective
DOE	U.S. Department of Energy
HWMA	Hazardous Waste Management Act
ICP-MS	inductively coupled plasma-mass spectroscopy
INL	Idaho National Laboratory
IQR	interquartile range
LCL	lower confidence limit
MDA	minimum detectable activity
PA	performance assessment
PCB	polychlorinated biphenyl
QC	quality control
RCRA	Resource Conservation and Recovery Act
RRF	relative response factor
SAP	sampling and analysis plan
SVOC	semivolatile organic compound
TFF	Tank Farm Facility
UCL	upper confidence limit
USC	United States Code
VOC	volatile organic compound



# **Data Quality Assessment Report for the Post-Decontamination Characterization of the Contents of Tank WM-180 and Associated Ancillary Equipment at the Idaho Nuclear Technology and Engineering Center Tank Farm Facility**

## **1. INTRODUCTION**

This report assesses the quality of data generated from liquid tank residuals and liquid residuals from the associated ancillary equipment collected following decontamination of Tank WM-180 and the associated vault sump at the Idaho Nuclear Technology and Engineering Center Tank Farm Facility (TFF). The purpose of this data quality assessment (DQA) report is to:

1. Compare the mean concentration (as represented by the upper confidence limit [UCL]) of Resource Conservation and Recovery Act (RCRA) (42 United States Code [USC] 6901 et seq., 1976) constituents to approved action levels (ALs) listed in the closure plan (DOE-ID 2004)
2. Compare the mean concentrations of radionuclides to the inventory prepared for the *Performance Assessment for the Tank Farm Facility at the Idaho National Engineering and Environmental Laboratory* (DOE-ID 2003)
3. Determine if the assumptions made about the data during the data quality objective (DQO) phase are correct.

In general, DQA provides a scientific and statistical evaluation of data to determine if the collected data are of the right type, quality, and quantity to support their intended use. The DQA process is designed around the key idea that data quality, as a concept, is only meaningful when it directly relates to the intended use of the data (EPA 2000a). Two primary questions can be answered using the DQA process:

1. Does the quality of the data permit decisions to be made with the desired degree of confidence?
2. How well can the sampling design be expected to perform over a wide range of possible outcomes? That is, can the sampling design strategy be expected to perform well in a similar study with the same degree of confidence even if the actual measurements are different than those obtained in the present study?

The first question addresses the immediate needs of the study. If the assessment shows that the data are of sufficient quality, then the decision-maker can make decisions using unambiguous data with the desired level of confidence (specified during data collection planning). However, if the data do not provide sufficiently strong evidence to support one decision over another, then appropriate data analysis can alert the decision-maker to the degree of ambiguity in the data. If this is the case, an informed decision can be made about how to proceed. For example, based on the data obtained, more data may be collected or the decision-maker may make a decision knowing there is a greater-than-desired uncertainty in the decision.

The second question addresses the potential future needs of the study. After the DQA is completed, personnel can determine how well the sampling design may perform at a different location given that

different environmental conditions and outcomes may exist. Because environmental conditions vary from location to location, it is important to examine the sampling design over a large range of possible settings to ensure that the design will be adequate in other scenarios.

Evaluation of collected data, referred to as the data life cycle, consists of three steps: planning, implementation, and assessment. The planning phase consists of documenting the data needs and plans for data collection using the DQO process (EPA 2000b). The DQOs define the qualitative and quantitative criteria for specifying the sampling procedure and establish the desired level of confidence for decision-making. The DQOs for this project are documented in the associated sampling and analysis plan (SAP) (ICP 2004a). The implementation phase consists of collecting the necessary data according to the SAP. Data assessment consists of both data validation (to make sure that all sampling and analysis protocols were followed) and analysis of the validated data set (to determine with what degree of confidence decisions can be made).

The following steps of the DQA process are discussed in this DQA report:

1. Review the DQOs and sampling design
2. Conduct a preliminary data review
3. Select a statistical test
4. Verify the assumptions of the selected test
5. Draw conclusions from the data.

## **2. REVIEW OF THE DATA QUALITY OBJECTIVES AND SAMPLING DESIGN**

The DQOs clearly define the principle study questions and issues being addressed and develop the approach that will be taken to resolve that problem. The DQOs consist of developing a problem statement and a decision statement, defining the decision inputs, defining study boundaries, developing a decision rule, establishing decision error limits, and optimizing the design. Data quality objectives were developed for both the tanks and the ancillary equipment simultaneously. Therefore, Steps 1–5 apply to both the tank residuals and the sump residuals and Steps 6 and 7 pertain to only the tank rinsates.

1. Problem Statement: Demonstrate that tank decontamination activities have met closure performance objectives.
2. Decision Statement: Determine whether decontamination of the TFF tank systems reduced the concentrations of constituents or properties (i.e., pH) of concern in the residuals remaining in the TFF system components below closure performance standards; if not, then Hazardous Waste Management Act (HWMA) (State of Idaho 1983)/RCRA landfill standards and/or alternate U.S. Department of Energy (DOE) requirements for closure must be met.
3. Decision Inputs: Concentrations of hazardous constituents and radionuclides present in the tank system after decontamination.
4. Study Boundaries:
  - a. Spatial Boundaries: Residual decontamination fluids remaining in the tank and the vault sump following decontamination. The data assessed in this report were generated from the sample analysis of residual tank liquids remaining after decontamination.
  - b. Temporal Boundaries: From the onset of decontamination to the completion of decontamination.
  - c. Scale of Decision-Making: The assumptions made in developing the performance assessment (PA) (DOE-ID 2003) will drive the scale of decision-making.
  - d. Practical Constraints: It is not possible to obtain samples from all areas of the tank and vault sump because of restricted access points and limitations on the available sampling methods.
5. Decision Rule: The parameter of interest is the mean concentration of the constituents of concern within the study boundaries. The decision rules are:
  - a. *If* the true mean concentration of any applicable hazardous waste constituent detected in toxicity characteristic leaching procedure analyses of the TFF residuals collected from the tank, or the vault sump is greater than the maximum concentration of contaminants for the toxicity characteristic listed in 40 Code of Federal Regulations (CFR) 261.24 (2005), or if the true mean pH of TFF residuals collected from the tank or sump exhibits the characteristic of corrosivity, *then* either additional decontamination steps will be undertaken or closure to HWMA/RCRA landfill standards will be considered.

- b. If the true mean concentration of any hazardous constituent detected in total constituent analyses of the TFF residuals is greater than or equal to the AL specified in the closure plan, then additional decontamination steps may be undertaken. Closure to HWMA/RCRA landfill standards will be considered at final closure of the TFF.
  - c. If the concentrations of hazardous constituents indicate that the closure performance standards have been met, then the TFF will be closed under a HWMA/RCRA clean closure.
6. Decision Error Limits: The outputs for the decision error limits are the null and alternative hypotheses and a quantification of the allowable error rates. The null hypothesis is “The concentration of at least one hazardous or radioactive constituent in TFF residuals following decontamination is equal to or exceeds action or inventory levels.” Conversely, the alternative hypothesis is “The concentrations of all hazardous or radioactive constituents in TFF residuals following decontamination are less than the specified action or inventory levels.” The lower boundary of the gray region ( $\Delta$ ) is set at 80% of the AL for all constituents of concern. Using the stated null hypothesis, the upper boundary of the gray region is always the constituent-specific AL. For pH, the gray region is bounded on one side by 2.0 and 12.5 (the ALs) and on the other side by 2.1 and 12.4, respectively. In the case of acidic conditions (low pH), the “lower boundary” of the gray region is actually a pH value greater than the AL because the “lower boundary” of the gray region is always in a direction away from the AL, which would result in rejection of the null hypothesis if the true mean value was equal to that value. That is, the gray region is that range of values where controlling the false-negative decision error is deemed unimportant relative to the cost of controlling that error. The chance of a false-positive decision error ( $\alpha$ ) is set at 5% and the chance of a false-negative decision error ( $\beta$ ) is set at 10%.
7. Design Optimization: A simple random sampling method was used to obtain samples. The standard deviation ( $\sigma$ ) was estimated to be 12.5% of the AL. The validity of this assumption is assessed later in this DQA report. Given the chosen  $\alpha$ ,  $\beta$ , and  $\Delta$  in conjunction with the estimated value for  $\sigma$ , a sample size ( $n$ ) of five was selected using Equation (1):

$$n = \frac{(z_{1-\alpha} + z_{1-\beta})^2 \sigma^2}{\Delta^2} + \frac{1}{2} z_{1-\alpha}^2 \quad (1)$$

where

- $n$  = the appropriate number of samples to collect to satisfy the DQOs
- $z_x$  = the  $z$  value for the  $x^{\text{th}}$  quantile of the standard normal distribution (from statistical tables)
- $\alpha$  = false-positive rate (5% or 0.05)
- $\beta$  = false-negative rate (10% or 0.10)
- $\sigma$  = estimated standard deviation of the population (12.5% of the constituent-specific AL)
- $\Delta$  = minimum detectable difference (the difference between the AL and the value at which the decision-maker wants to specify a false-negative decision error rate; in this case,  $\Delta$  is 20% of the constituent-specific AL).

Equation (2) shows the solution of this formula for the Tank WM-180 sampling and analysis activity:

$$n = \frac{(1.645 + 1.960)^2 (12.5)^2}{(20)^2} + \frac{1}{2} (1.645)^2 = 4.70 \quad (2)$$

Based on the results of Equation (2), five samples of the residual decontamination fluids remaining in the tank were collected for the applicable analyses. However, sampling for the vault sump associated with WM-180 was controlled by practical constraints. One sample of vault sump rinsate was collected.



### 3. PRELIMINARY DATA REVIEW

The purpose of the preliminary data review is to examine the data using graphical methods and numerical summaries to gain familiarity with and achieve an understanding of the “structure” of the data. A preliminary data review should be performed whenever data are used, regardless of the data use. This type of examination allows for identification of appropriate approaches for further analysis and limitations of the data. The two main approaches to a preliminary data review are: (1) calculation of basic statistical quantities (or summary statistics) and (2) graphical representations of the data. Appendixes A–E of this report provide the graphical representations of Tank WM-180 data. The calculated summary statistics are discussed in this section, and the graphical review of the data is discussed in Subsections 7.1–7.5 when distribution of the data is assessed. The summary statistics and graphical methods discussed in this section are computed for the tank rinsate data only. Data from the sump rinsate are assessed in tabular format because the sample size does not allow computation of the following statistical quantities or production of the discussed plots. Tables for the sump data are listed in Section 8.

The summary statistics that were calculated for the detected constituents were measures of center (mean and median) and measures of spread (standard deviation, coefficient of variation [CV], interquartile range [IQR], and range). One measure of primary interest is the center of the data. The average ( $\bar{x}$ ), or the mean, is the most commonly used measure of the central tendency of the data. However, it is heavily influenced by outliers and asymmetric data. The mean is calculated using Equation (3):

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} \quad (3)$$

where

$\bar{x}$  = mean

$n$  = number of observations

$x_i$  =  $i^{th}$  observation.

The median is the preferred measure of the center of the data if outliers are present in the data or if the data are skewed. The median is the observation such that 50% of the data lie below the median and 50% of the data lie above the median. If the data are symmetric, the mean and the median are equal to each other.

Another quantity of interest is the spread of the data. The standard deviation ( $s$ ) is the most commonly used measure of spread. This is because it is fairly easy to interpret and is an input for many statistical quantities and techniques. Because it is calculated using the average, it is also sensitive to outliers and asymmetry. The standard deviation is calculated using Equation (4):

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} \quad (4)$$

where

- $s$  = standard deviation  
 $n$  = number of observations  
 $x_i$  =  $i^{th}$  observation  
 $\bar{x}$  = mean of the observations.

The CV is also calculated for each detected analyte. The CV is a relative measure of variation. That is, it is a measure of the standard deviation relative to the mean, expressed as a percentage. This measure provides a way to directly compare the standard deviations of two different data sets that may otherwise not be directly comparable. However, it is important to note that the mean of the data may be very close to or very far away from zero and the spread may be independent of the distance of the mean from zero. Therefore, no firm guidelines have been established for interpreting the CV. The formula for calculating the CV is shown in Equation (5):

$$CV = \frac{s}{\bar{x}} \times 100\% \quad (5)$$

where

- $s$  = standard deviation  
 $\bar{x}$  = mean of the observations.

The IQR is a measure of spread that is not influenced by outliers. It is calculated by subtracting the first quartile from the third quartile. The first quartile is the 25<sup>th</sup> percentile of the data and the third quartile is the 75<sup>th</sup> percentile of the data. The IQR is a preferred measure of spread when extreme outliers or asymmetry exist in the data. Otherwise, the standard deviation is the preferred measure of spread.

Another measure of spread is the range of the data. The range is calculated by subtracting the smallest value in the data from the largest value. It can be a valuable piece of information in characterizing the spread of the data but can be deceptively large if the data contain any outliers. Therefore, the data should always be examined for outliers when the range is used as a summary statistic.

The five-number summary is calculated for pH and the inorganic, organic, and radionuclide analytes. The five-number summary is a presentation of the minimum value, the first quartile, the median, the third quartile, and the maximum value of the data. This summary provides non-parametric information about the general spread and pattern of the data.

It is difficult to read a table of numerical summary statistics and identify the degree of symmetry or normality of the data. Therefore, the graphical representations are shown in Appendixes A–E to aid the data user in assessing the symmetry and normality of the data collected. Graphical representations of the data include boxplots and normal-quantile plots.

Boxplots are a way of graphically viewing the five-number summary. The plot consists of a central box with a line or other mark inside of the box. Two lines come out of the ends of the box in either direction. The line, or mark, inside the box identifies the median, the edges of the box are located at the two quartiles, and the extreme ends of the lines represent the largest and smallest observations within

1.5 times the IQR from the box, which are the minimum and maximum values in this study. This type of plot allows for a quick and comprehensive analysis of the symmetry of the data. It can be easily determined if the data are symmetric, right-skewed, or left-skewed. Right-skewed data have a lengthened tail at the higher values of the distribution. This tail pulls the mean toward it, causing the mean to be high relative to the center of the data. This makes it more likely for a tank to be declared insufficiently decontaminated when, in fact, it is sufficiently clean. Left-skewed data have a lengthened tail at the lower values of the distribution. This tail pulls the mean toward it causing the mean to be lower than the center of the data. Left-skewed data cause the UCL to be low-biased, making it more likely to show the tank is clean when, in fact, the concentration of that analyte exceeds the AL.

The normal-quantile plot is used to determine if the data follow a normal distribution. If the data follow a normal distribution then the points on the graph lie along a straight line. Any deviations from a straight line are indicative of deviations from normality. If the tails bend away from the line at only one end of the line, then the data are asymmetric. If the data veer away from the line at both ends, then the tails of the distribution are either too heavy or too light to assume a normal distribution. It is important to note that no real world data set is perfectly normal so a certain amount of deviation from the line is to be expected, even in data that are sufficiently normal to perform the desired analysis.

Section 7 provides an overall analysis of the data pertaining to the samples collected from the post-decontamination tank contents. Because decontamination activities reduced the volume of solids remaining in the tank to less than 15% by volume of the total sample collected, the solids portion of the samples collected were not analyzed and compared with the ALs for regulated constituents. Samples taken from Tank WM-180 and the associated vault sump were analyzed for pH and inorganic, organic, and radionuclide constituents. Each analysis type is discussed separately in Subsections 7.1–7.5 for the tank residuals. Results for the sump are discussed in Section 8. The impact of laboratory performance on the data quality is discussed, and detected analytes are examined statistically.



## 4. STATISTICAL TEST SELECTION

Once the preliminary data review is completed, an appropriate statistical hypothesis test may be selected to answer the question(s) for which the data were collected. The data are analyzed to determine whether the data meet the assumptions of the desired test(s).

One of the primary requirements of many hypothesis tests is that the sample mean has a normal distribution. Tests that require the assumption of normality are generally more efficient than non-parametric tests (i.e., tests that do not require the data to follow a specific distribution). That is, a test that requires the sample mean to have a normal distribution can provide more accurate and reliable information with fewer data points than a test that does not require the data to conform to a specific distribution. If the data have a normal distribution then the sample mean also has a normal distribution. However, if the data do not have a normal distribution the sample mean may still have a normal distribution. The Central-Limit Theorem states that the distribution of the sample mean is normal, regardless of the distribution of the data, if the sample size is sufficiently large. The more the data deviate from the normal distribution, the larger the sample size must be to ensure that the distribution of the sample mean is normal. If data are not normal in distribution, non-parametric methods are used to analyze the data.

Non-parametric tests are appropriate if the sample mean does not follow a normal distribution and there is an insufficient number of data points to assume that the sample mean follows a normal distribution. Although they do not require the data to exhibit a normal distribution, most non-parametric hypothesis tests also have assumptions that must be met. One of the most common assumptions for one-sample non-parametric tests is that the data have a symmetric distribution. The assumptions of a selected hypothesis test, whether parametric or non-parametric, must be verified before the test is performed on the data.

The primary question to be answered in relation to the post-decontamination contents of Tank WM-180 is: Does the mean concentration of any constituent of concern exceed the specified AL or radionuclide inventory? The appropriate test to answer this question compares the sample mean to a constituent-specific AL. Three methods are appropriate for answering this type of question: the one-sample  $z$ -test, the one-sample  $t$ -test, and the one-sample bootstrapping test of means.

The  $z$ -test requires: (a) knowledge of the population standard deviation ( $\sigma$ ) and (b) that the sample mean follows a normal distribution. Because the population standard deviation for each constituent concentration in the post-decontamination contents of Tank WM-180 is not known, the  $z$ -test is not considered further. The  $t$ -test allows the use of the sample standard deviation ( $s$ ), which is an estimate of  $\sigma$ . The  $t$ -test also requires that the sample mean follows an approximate normal distribution. It is important to note that if the data follow a normal distribution, the sample mean also has a normal distribution (as proven by a mathematical theorem). However, if the data do not follow a normal distribution, the sample mean still follows a normal distribution if the sample size is sufficiently large (as shown by the Central-Limit Theorem). Bootstrapping uses resampling techniques to perform various statistical tests, including a statistical test that compares a mean concentration with an AL. Bootstrapping is a non-parametric method without distributional assumptions that must be met. It is difficult to define such quantities as  $\beta$  or  $\Delta$  so although the results are reliable, there is more ambiguity in determining the efficiency of the test than with the  $t$ -test. Because the  $t$ -test allows use of the sample standard deviation ( $s$ ) and is a very powerful test for small data sets and error rates are less ambiguous, the  $t$ -test is chosen as the most desirable means for testing the null hypothesis. Thus, if the data are determined to be normally distributed then the one-sample  $t$ -test is used. If the data are not normal in distribution then bootstrapping is used to perform the appropriate comparisons. After selecting a statistical test, it is necessary to verify the assumptions of the test selected. These assumptions are discussed in Section 5.



## **5. VERIFICATION OF THE ASSUMPTIONS FOR THE SELECTED HYPOTHESIS TEST**

This section examines the underlying assumptions of the statistical hypothesis test in light of the data collected. Both parametric and non-parametric tests require the samples to be independent of each other, and this assumption should be verified. In addition, to select the appropriate test, the distributions of the data obtained for each analyte need to be evaluated. Parametric tests, which require the sample mean to be normally distributed, can provide more accurate and reliable answers with fewer data points than non-parametric tests, and therefore, are the preferred tests. Also, if the data have a normal distribution, the sample mean also follows a normal distribution. Consequently, it must first be determined if the data follow a normal distribution. This is done using graphical methods such as boxplots and normal-quantile plots. Statistical tests such as the Shapiro-Wilk test can be performed to determine if the data follow a normal distribution, but they have their limitations. If the data set is large, even data that are very close to normal in distribution may not pass the test. If the data set contains a small number of data points, it can be difficult for distributional tests to detect deviations from normality in the data. However, the standard deviations for analytes in Tank WM-180 are small compared to the ALs, and the observed concentrations are less than the ALs to such a degree that five samples are adequate for confidently declaring Tank WM-180 sufficiently clean for closure.

In the analysis of the Tank WM-180 rinsate data, graphical methods and the Shapiro-Wilk test were used to assess normality. Boxplots and normal-quantile plots of the data were prepared using S-Plus 2000 (Insightful Corporation 2000) software. Analyse-It software (Analyse-It 2003) was used to perform the Shapiro-Wilk test calculations. Because five samples were taken from the tank, histograms were not very informative. Normal-quantile plots and the Shapiro-Wilk test were the primary graphical method used to evaluate whether the data exhibit a normal distribution. These plots are presented in Appendices A–E of this report. The assessment of normality of the data is discussed in the following subsections.

Because the primary objective of the statistical analysis is to determine if the mean concentration of a specified analyte is less than its associated AL, the following criteria have been developed in dealing with deviations from normality:

- If the Shapiro-Wilk test indicates that the data are normally distributed at the  $\alpha = 0.05$  level and the summary statistics and plots indicate that the data are symmetric, then the  $t$ -test is performed on the data
- If the distribution of the data does not appear to be sufficiently normal in distribution to justify use of the  $t$ -test, bootstrapping is used to perform a non-parametric test.

The results of the Shapiro-Wilk test are reported in Subsections 7.1–7.5 for analytes detected in the tank final rinsates.

### **5.1 Verification of Standard Deviation Assumption**

The SAP associated with this project assumed a standard deviation of 12.5% of the AL to estimate the sample size necessary to achieve the desired  $\alpha$  and  $\beta$ . The ratio (standard deviation)/(AL) was measured for each detected analyte. Each analyte has a ratio of less than 1%. This implies that the standard deviation assumption is met for each of the analytes and the chosen levels of  $\alpha$  and  $\beta$  are, in fact, conservative estimates of true levels of  $\alpha$  and  $\beta$  achieved using the data sets for this analysis.

Table 1 provides the complete list of standard deviation to AL comparisons for detected metals, anions, and organic analytes. Analytes that were not detected in four or more sample or for which no AL exists were excluded from the table. Likewise, Table 2 provides the comparison of standard deviation to PA modeled inventory values for detected radionuclides.

## 5.2 Verification of Independence Between Risers

One of the primary assumptions for performing the *t*-test is that the samples are independent from one another. The sampling method ensured that the samples retrieved from each of the risers were independent of the riser from which they were taken. The contents of the tank were thoroughly mixed and then one sample was taken from each of the risers. The contents of the tank were thoroughly agitated again and a sample was taken from one additional riser. Because the rinsate came in contact with all surfaces of the tank during agitation and sampling was completed quickly after agitation, each sample had equal chance of being selected regardless of which riser it was collected from. Therefore, it can be assumed that the sample was truly a simple random sample and that the samples were indeed independent from one another and the location from which they were collected.

Table 1. Summary of comparison of standard deviation to action level for detected organic and inorganic analytes.

Analyte	Standard Deviation	Action Level	Ratio of Standard Deviation to Action Level (%)
<b>Metals (µg/L)</b>			
Aluminum	24.5	3,100,000	<1.0
Chromium	1.3	900	<1.0
Iron	33.5	1,700,000	<1.0
Manganese	0.70	490,000	<1.0
Mercury	1.1	160	<1.0
Nickel	1.26	440,000	<1.0
Silver	11.8	3,000	<1.0
Zinc	0.63	1,700,000	<1.0
<b>Anions (mg/L)</b>			
Fluoride	0.0030	770	<1.0

Table 2. Summary of comparison of standard deviation to inventory value for detected radionuclides.

Analyte	Standard Deviation (pCi/L)	Inventory Level (pCi/L)	Ratio of Standard Deviation to Inventory Level (%)
<sup>241</sup> Am	3.58E+02	3.60E+07	<1.0
<sup>137</sup> Cs	9.69E+04	1.15E+11	<1.0
<sup>154</sup> Eu	5.26E+01	1.83E+08	<1.0
<sup>63</sup> Ni	1.91E+01	8.70E+07	<1.0
<sup>237</sup> Np	3.92E+01	3.43E+05	<1.0
<sup>238</sup> Pu	8.41E+03	5.70E+08	<1.0
<sup>239/240</sup> Pu	1.89E+03	7.05E+07	<1.0
<sup>241</sup> Pu	9.07E+03	4.24E+08	<1.0
<sup>125</sup> Sb	1.82E+03	1.49E+06	<1.0
<sup>99</sup> Tc	9.65E+01	2.99E+07	<1.0
Total Sr ( <sup>90</sup> Sr)	5.86E+03	8.15E+10	<1.0



## 6. IMPLEMENTATION OF THE STATISTICAL TEST

If the preliminary data analysis and the evaluation of test assumptions indicate that the *t*-test may be appropriately applied to determine if the mean concentration of any constituent of concern exceeds its specified AL, then the test is applied to the data. Otherwise, bootstrapping is used to perform the appropriate comparison. The review of the data relative to distributional assumptions is provided in Subsections 7.1–7.5 and shows that the assumption is adequately met for all data except as noted.

The appropriate type of statistical hypothesis test for use on the observed data is a one-sample test on means. This test compares the sample mean with the AL to determine if it is likely that the population mean exceeds the AL. This test can be implemented in several ways. The traditional method for the *t*-test is to compute a *t*-statistic from the observed data and the AL and then use it to determine the appropriate *p*-value. The *p*-value is the probability that a sample mean as small, or smaller, than the one observed will be seen if the tank is contaminated. Therefore, the smaller the *p*-value is, the less likely the contamination in the tank will exceed the AL. Another way to run the *t*-test is to compare the UCL computed using the *t*-statistic [as seen in Equation (6)] to the AL. If the UCL is less than the AL then it can be concluded that decontamination efforts have been successful. A common way of performing a one-sample test of the mean using bootstrapping is to compute a UCL using resampling methods and then directly compare the UCL to an AL. The UCL comparison is the method that is used in this document for both the *t*-test and the bootstrap method.

The UCL of the sample mean is calculated using Equation (6):

$$UCL = \bar{x} + t_{1-\alpha, df}^* \frac{s}{\sqrt{n}} \quad (6)$$

where

$\bar{x}$  = sample mean.

$t_{1-\alpha, df}^*$  = *t*-statistic for the confidence level,  $(1 - \alpha)*100\%$ , and degree of freedom, *df*. In this case, the confidence is  $(1 - 0.05)*100\% = 95\%$  and the *dfs* are  $n - 1 = 4$ . From statistical tables, this corresponds to a value of 2.132 (or 2.776 for pH as explained below).

$s$  = sample standard deviation.

$n$  = number of samples taken.

The 95% lower confidence limit (LCL) is also of importance to analyzing the pH. Because the pH has ALs for both high pH and low pH, it is necessary to determine if the pH is less than the LCL. Because both the LCL and UCL are important, the *t*-value for the LCL and UCL are determined with  $\alpha/2$  instead of  $\alpha$  to ensure that the total probability of a false-positive decision error occurring is  $\alpha$  rather than  $2*\alpha$ . The LCL is compared to a pH of 2 to ensure that the true mean is greater than 2 at the specified degree of confidence. The LCL is calculated using Equation (7):

$$LCL = \bar{x} - t_{1-\alpha/2, df}^* \frac{s}{\sqrt{n}} \quad (7)$$

where

$\bar{x}$  = sample mean.

$t_{1-\alpha/2, df}^*$  =  $t$ -statistic for degree of confidence,  $(1 - \alpha)*100\%$ , and degree of freedom,  $df$ . In this case, the confidence is  $(1 - 0.05)*100\% = 95\%$  and the  $dfs$  are  $n - 1 = 4$ . Because the LCL and the UCL are being compared with the AL,  $\alpha/2 = 0.025$  is used to determine the appropriate  $t$ -value. From statistical tables, this corresponds to a value of 2.776.

$s$  = sample standard deviation.

$n$  = number of samples taken.

If the data are not normal in distribution, then bootstrapping is used to compute a 95% UCL for the data. Bootstrapping is a technique in the family of Monte Carlo methods that “resamples” the observed data to obtain more information about the population. In the case of the tank data, the observed data for the analyte in question is sampled, with replacement, five times. A sample mean is then computed from this “new” data set. This process is repeated 1,000 times to obtain 1,000 sample means. Traditionally, the 95% UCL of the data is the 95<sup>th</sup> percentile of the 1,000 sample means generated by the bootstrap method. However, bootstrap UCLs computed in this document were determined using the BC<sub>a</sub> method. The BC<sub>a</sub> method does not assume that the 95<sup>th</sup> percentile of the resampled means produces a 95% UCL. Rather, it uses information obtained from the data to determine which percentile of the resampled sample means represents a 95% UCL. This method constructs a more accurate UCL than using the 95<sup>th</sup> percentile as the UCL. The BC<sub>a</sub> UCL can be directly compared to an AL to perform a statistical test. For further details on bootstrapping and the BC<sub>a</sub> UCL see *An Introduction to the Bootstrap* (Efron and Tibshirani 1994).

The UCLs and ALs are used to implement the appropriate test. Decisions about whether the ALs may have been exceeded for each of the detected organic and inorganic constituents are presented in Subsections 7.1–7.3. The LCL is also presented for pH to ensure that neither AL was exceeded. The results for pH are included in Subsection 7.4.

No specific regulatory thresholds relative to the activity (i.e., concentrations) exist for the radionuclides left in any one tank after decontamination. Rather, the total inventory of radionuclides remaining in all closed components of the TFF will be evaluated following completion of the TFF decontamination efforts. The PA (DOE-ID 2003) conducted to address the DOE Order 435.1 (2001) closure requirements provides an estimate of acceptable radionuclide concentrations in the liquids remaining in each tank following decontamination. While these modeled levels are not the basis for a decision such as continuing to clean a tank, the modeled values required to meet DOE closure standards can be compared with the levels achieved through decontamination efforts. Because of this, hypothesis testing is not required to make decisions concerning whether decontamination of Tank WM-180 may cease; however, hypothesis testing using the modeled value as the AL provides information on the decontamination effort for the radionuclides. Subsection 7.5 provides the UCLs for radionuclides and compares them with the PA modeled inventory (DOE-ID 2003).

## 7. NUMERICAL RESULTS OF DATA ANALYSIS

This section provides the results for the preliminary data analysis, verification of test assumptions, and the test results for each of the constituents and radionuclides of concern. Each type of analyte is presented in its own subsection for ease of reference.

### 7.1 Data Assessment for Metals

This subsection provides all of the preliminary data analysis, normality verification, and test results for the metals detected in the tank residuals. Data generated from these analyses were validated in accordance with Idaho National Laboratory (INL) technical procedures and data validation flags assigned to sample results were based on the laboratory's performance on associated quality control (QC) analyses. No significant issues with QC that would negatively impact the data usability were noted during validation (Portage 2005a).

Metals that were not detected in tank residuals are not discussed in this document. Table 3 lists the metals detected in the tank residuals. Calcium and potassium are both detected in less than three of the five samples. Therefore, there is an insufficient number of detected values to compute summary statistics or a UCL for either of these analytes and they are not listed in Tables 4–7. However, neither of these analytes has an AL so this is not an issue from a regulatory perspective.

Table 3. Metals detected in the Tank WM-180 liquid residuals.

Detected Metals		
Aluminum	Manganese	Potassium <sup>a</sup>
Calcium <sup>a</sup>	Mercury	Silver
Chromium	Molybdenum	Zinc
Iron	Nickel	

a. This analyte was detected in less than three of the five samples; therefore, insufficient data are available to perform meaningful statistics.

#### 7.1.1 Preliminary Data Analysis for Metals Data

The preliminary data analysis consists of several statistical quantities of interest and the five-number summary for the metals. In Table 4, the measures of central tendency and spread for metals are listed. Table 5 provides the five-number summary for each of the detected analytes. Boxplots and normal-quantile plots for metals are shown in Appendix A. Results of the preliminary data analysis indicate that chromium may be bimodal. Also, iron, molybdenum, and silver are all potentially right-skewed. This potential asymmetry in the data is discussed further in the following subsection. Laboratory results and associated validation flags for metals data for Tank WM-180 are listed in Appendix F.

Table 4. Summary statistics of central tendency and spread for metals detected in the Tank WM-180 liquid residuals.

Analyte	Mean ( $\mu\text{g/L}$ )	Median ( $\mu\text{g/L}$ )	Standard Deviation ( $\mu\text{g/L}$ )	Coefficient of Variation (%)	Interquartile Range ( $\mu\text{g/L}$ )	Range ( $\mu\text{g/L}$ )
Aluminum	48.2	42.2	24.5	50.8	24.8	63.6
Chromium	4.3	5.1	1.3	30	2.2	2.5
Iron	42.6	34.4	33.5	78.7	30.9	82.1
Manganese	2.2	1.9	0.7	31	1.2	1.5
Mercury	5.6	6.1	1.1	20.3	1.5	2.7
Molybdenum	6.9	6.3	2.1	30.4	0.3	5.5
Nickel	8.6	8.5	1.3	15	1.2	3.2
Silver	46.4	42.5	11.8	25.4	7.5	29.8
Zinc	2.8	2.8	0.63	23	0.5	1.7

Table 5. Five-number summary of metals detected in the Tank WM-180 liquid residuals.

Analyte	Minimum Value ( $\mu\text{g/L}$ )	First Quartile ( $\mu\text{g/L}$ )	Median ( $\mu\text{g/L}$ )	Third Quartile ( $\mu\text{g/L}$ )	Maximum Value ( $\mu\text{g/L}$ )
Aluminum	20.3	35.0	42.2	59.8	83.9
Chromium	2.8	3.0	5.1	5.2	5.3
Iron	15.4	17.3	34.4	48.2	97.5
Manganese	1.5	1.7	1.9	2.9	3.0
Mercury	4.1	4.7	6.1	6.2	6.8
Molybdenum	5.0	6.2	6.3	6.5	10.5
Nickel	7.4	7.7	8.5	8.9	10.6
Silver	36.6	39.6	42.5	47.1	66.4
Zinc	1.8	2.6	2.8	3.1	3.5

### 7.1.2 Normality of the Metals Data

Detected metals data are also analyzed using normal-quantile plots and the Shapiro-Wilk test. Normal-quantile plots and the Shapiro-Wilk test indicate that each of the metals is normally distributed with the exception of chromium. Therefore, the UCL for chromium was computed using the bootstrap method. Table 6 lists the results of the Shapiro-Wilk test for the tank residuals.

Table 6. Results of the Shapiro-Wilk test for metals constituents.

Analyte	Test Statistic	p-value	Are Data Normal?
Aluminum	0.9712	0.8831	Yes
Chromium	0.7526	0.0314	No
Iron	0.8563	0.2154	Yes
Manganese	0.8445	0.1779	Yes
Mercury	0.9105	0.4705	Yes
Molybdenum	0.7905	0.0677	Yes
Nickel	0.9199	0.5291	Yes
Silver	0.8374	0.1580	Yes
Zinc	0.9702	0.8764	Yes

### 7.1.3 Implementation of the Statistical Test

Results from the previous subsections indicate that the *t*-test is appropriate for use on all of the metals with the exception of chromium. The UCL for chromium was computed using the bootstrap method. Table 7 lists the UCLs and ALs for each of the metals detected in four or more samples.

Table 7. Summary of post-decontamination concentrations of metal constituents detected in the rinsate of Tank WM-180.

Analyte	Mean ( $\mu\text{g/L}$ )	<i>t</i> -value	95% UCL ( $\mu\text{g/L}$ )	Action Level ( $\mu\text{g/L}$ )	Action Level Exceeded?
Aluminum	48.2	2.132	71.6	3,100,000	No
Chromium	4.3	NA	4.8 <sup>a</sup>	900	No
Iron	42.6	2.132	74.5	1,700,000	No
Manganese	2.2	2.132	2.9	490,000	No
Mercury	5.6	2.132	6.7	160	No
Molybdenum	6.9	2.132	8.9	NA	NA
Nickel	8.6	2.132	9.8	440,000	No
Silver	46.4	2.132	57.7	3,000	No
Zinc	2.8	2.132	3.4	1,700,000	No

NA = Not applicable.

a. UCL computed using the bootstrap method.

It can be seen from the results in Table 7 that none of the metals exceeded their specified ALs. Therefore, decontamination of Tank WM-180 has been successful with respect to metal constituents of concern.

## 7.2 Data Assessment for Anions

This subsection provides all of the preliminary data results, normality verification, and test results for anions detected in the tank residuals. Data generated from these analyses were validated in accordance with INL technical procedures. No issues with any of the associated QC analyses were noted during validation, and no validation flags were assigned to any of the Tank WM-180 sample results (Portage 2005b). The reported results for anions are shown in Appendix G.

Table 8 lists the anions both detected in the WM-180 tank residuals and discussed in the next subsection. Each detected anion is detected in a sufficient number of samples to compute an UCL.

Table 8. Anions detected in the Tank WM-180 liquid residuals.

Detected Anions		
Chloride	Nitrate	Sulfate
Fluoride	Phosphate	

### 7.2.1 Preliminary Data Analysis for Anions

Table 9 lists the measures of central tendency and spread for anions and Table 10 provides the five-number summary for each of the detected anions. Nitrate is potentially right-skewed. Fluoride has three values that are identical. Since they are the three middle values, it is possible that the data are still normal. The distributions of all of the anions are discussed further in the next subsection. Boxplots and normal-quantile plots for anions are shown in Appendix B. Laboratory results and associated validation flags for anions data for WM-180 are listed in Appendix G.

Table 9. Summary statistics of central tendency and spread for anions detected in the Tank WM-180 liquid residuals.

Analyte	Mean (mg/L)	Median (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)	Interquartile Range (mg/L)	Range (mg/L)
Chloride	0.068	0.064	0.017	24	0.020	0.042
Fluoride	0.031	0.030	0.003	9.8	0.0	0.008
Nitrate	1.19	1.20	0.11	9.24	0.10	0.27
Phosphate	0.20	0.20	0.02	11	0.02	0.06
Sulfate	0.17	0.16	0.02	14	0.02	0.06

Table 10. Five-number summary for anions detected in the Tank WM-180 liquid residuals.

Analyte	Minimum Value (mg/L)	First Quartile (mg/L)	Median (mg/L)	Third Quartile (mg/L)	Maximum Value (mg/L)
Chloride	0.048	0.06	0.064	0.08	0.09
Fluoride	0.028	0.03	0.03	0.03	0.036
Nitrate	1.1	1.1	1.2	1.2	1.37
Phosphate	0.18	0.19	0.2	0.21	0.24
Sulfate	0.14	0.16	0.16	0.18	0.2

### 7.2.2 Normality of the Anions Data

Detected anions are analyzed using normal-quantile plots and the Shapiro-Wilk test. Table 11 contains the results of the Shapiro-Wilk test for the anions data. The Shapiro-Wilk test indicates that fluoride is not normal in distribution. Therefore, bootstrapping was used to compute the UCL for fluoride.

Table 11. Results of the Shapiro-Wilk test for anions.

Analyte	Test Statistic	<i>p</i> -value	Are Data Normal?
Chloride	0.9682	0.8639	Yes
Fluoride	0.7683	0.0435	No
Nitrate	0.8507	0.1969	Yes
Phosphate	0.9427	0.6853	Yes
Sulfate	0.9609	0.8140	Yes

### 7.2.3 Implementation of the Statistical Test

Results from the previous subsections indicate that the *t*-test can be performed on all of the anions with the exception of fluoride. The test for fluoride was performed using the bootstrap method. Table 12 lists the UCLs and ALs for each of the anions detected in the tank residuals.

Table 12. Summary of post-decontamination concentrations of anion constituents detected in the rinsate of Tank WM-180.

Analyte	Mean (mg/L)	<i>t</i> -value	95% UCL (mg/L)	Action Level (mg/L)	Action Level Exceeded?
Chloride	0.068	2.132	0.084	NA	NA
Fluoride	0.031	NA	0.032 <sup>a</sup>	770	No
Nitrate	1.19	2.132	1.30	NA	NA
Phosphate	0.20	2.132	0.23	NA	NA
Sulfate	0.17	2.132	0.19	NA	NA

NA = Not applicable.

a. UCL computed using the bootstrap method.

Results presented in Table 12 indicate that none of the anions exceed their ALs. Therefore, it can be concluded that decontamination efforts with respect to anions in Tank WM-180 have been successful.

## 7.3 Data Assessment of Organics

Samples collected from Tank WM-180 were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Data generated from these analyses were validated according to INL technical procedures and data validation flags were assigned to results based on laboratory performance on associated QC analyses.

During validation of the VOCs, no QC issues that would negatively impact data usability were identified (EVAC 2005a; Tetra Tech 2005). Undetected sample results reported for the compounds dichlorodifluoromethane, bromomethane, and trans-1,3-dichloropropene were flagged “UJ” (undetected estimate) based on relative standard deviation during the initial calibration. The percent relative standard deviations (or CVs) for these compounds (21.6%, 20.1%, and 25.8%) exceed the 15% criterion for precision between the six calibration levels. However, all three compounds were detected in all six calibration levels. Had any of these compounds been present in the samples, a detection would have been made. Also, 2-butanone (methyl ethyl ketone) was reported below the quantitation limit and flagged “J” to denote an estimated value.

During the validation of SVOC data (EVAC 2005b), minor issues having minimal impact on data usability were noted. The more significant issues for which the validation qualifying flag “R” (rejected) was assigned are addressed in this report. Undetected results for the compound dibenzo(a,h)anthracene were rejected during validation to denote the potential low bias reflected in the relative response factor (RRF) from the initial calibration. Although the RRF for this compound (0.033) was below the validation criterion of 0.05, the compound was detected in all five concentration levels of the initial calibration and in continuing calibration. Therefore, it is reasonable that dibenzo(a,h)anthracene would have been detected had it been present in the samples, and the data usability of the undetected sample results was not negatively impacted.

No issues impacting data usability of the PCB results were noted (EVAC 2005c).

Most of the organic constituents of concern were not detected in the post-decontamination tank contents. Table 13 lists the organic compounds that were detected in the tank residuals. The only organic compound present in a sufficient number of samples to compute summary statistics or a UCL is tri-n-butyl phosphate. Each of the other organic compounds was detected in only one of the five samples. The observed value for 2-butanone is 1.1 µg/L and the AL is 160,000 µg/L. The detected value for 2,4-dinitrophenol is 1.3 µg/L and the AL is 140,000 µg/L. Therefore, the concentration of each of these analytes is confidently less than the regulatory threshold. Laboratory results and associated validation flags for all organics data for Tank WM-180 are listed in Appendix H.

Table 13. Organic compounds detected in the Tank WM-180 liquid residuals.

Detected Organics		
2,4-Dinitrophenol <sup>a</sup>	2-Butanone (MEK) <sup>a</sup>	Tri-n-butyl phosphate
a. This analyte was detected in less than three of the five samples; therefore, insufficient data are available to perform meaningful statistics.		

### 7.3.1 Preliminary Data Analysis for Organic Constituents

The measures of central tendency and spread and the five-number summary for tri-n-butyl phosphate are presented in Tables 14 and 15, respectively. Boxplots and normal-quantile plots are in Appendix D. The preliminary data analysis indicates that the tri-n-butyl phosphate data are right-skewed. This potential non-normality is discussed further in the next subsection.

Table 14. Summary statistics of central tendency and spread for organic compounds detected in the Tank WM-180 liquid residuals.

Analyte	Mean (µg/L)	Median (µg/L)	Standard Deviation (µg/L)	Coefficient of Variation (%)	Interquartile Range (µg/L)	Range (µg/L)
Tri-n-butyl phosphate	14.1	13.4	2.9	20.6	1.0	7.2

Table 15. Five-number summary for organic compounds detected in the Tank WM-180 liquid residuals.

Analyte	Minimum	First Quartile (µg/L)	Median (µg/L)	Third Quartile (µg/L)	Maximum
	Value (µg/L)				Value (µg/L)
Tri-n-butyl phosphate	12.0	12.5	13.4	13.5	19.2

### 7.3.2 Normality of Organic Data

Results of the normal-quantile plots and the Shapiro-Wilk test show that the tri-n-butyl phosphate data are not normally distributed. Thus, bootstrapping was used to compute the UCL. Table 16 lists the results of the Shapiro-Wilk test.

Table 16. Results of the Shapiro-Wilk test for organic constituents.

Analyte	Test Statistic	p-value	Are Data Normal?
Tri-n-butyl phosphate	0.7470	0.0279	No

### 7.3.3 Implementation of the Statistical Test

Results from the previous subsections indicate that bootstrapping should be used to compute the UCL for tri-n-butyl phosphate. Table 17 lists the UCLs and ALs for each of the organics detected in tank residuals.

Table 17. Summary of post-decontamination concentrations of organic constituents detected in the rinsate of Tank WM-180.

Analyte	Mean ( $\mu\text{g/L}$ )	t-value	95% UCL ( $\mu\text{g/L}$ )	Action Level ( $\mu\text{g/L}$ )	Action Level Exceeded?
Tri-n-butyl phosphate	14.1	NA	16.7 <sup>a</sup>	NA	NA

NA = Not applicable.

a. UCL computed using the bootstrap method.

It can be seen from the results presented in this subsection that the mean concentrations of all of the organic constituents do not exceed the associated ALs. All of the organic compounds were either not detected in any of the samples or only one sample had a detected value, with the exception of tri-n-butyl phosphate. Each of the detected limits or detected values is considerably smaller than the ALs. Tri-n-butyl phosphate is the only organic for which an UCL is computed and no AL is associated with this compound. Therefore, decontamination goals with respect to organic constituents of concern have been achieved.

## 7.4 Data Assessment for pH

The pH of the samples collected from the Tank WM-180 post-decontamination residuals was also measured. The analytical data generated for pH were of high quality, and no data quality issues were noted during validation (Portage 2005b). The reported results and validation flags for pH are shown in Appendix G. This subsection contains the preliminary data analysis, test assumption verification, and the implementation of the statistical test for pH.

### 7.4.1 Preliminary Data Analysis

Tables 18 and 19 list the summary statistics calculated for pH. The associated boxplot and normal-quantile plot are in Appendix C. Laboratory results and associated validation flags for pH data for Tank WM-180 rinsates are in Appendix G. Each measured pH value is identical and has a reported pH of 4.6. Thus, the estimated standard deviation and CV are zero and the distributional pattern is difficult to extrapolate to the population distribution. However, because all five values have the same reported pH, it can be assumed that tank residuals are very homogeneous with respect to pH. This implies that the observed pH from the samples is confidently indicative of the true average pH in the entire tank.

Table 18. Summary statistics of central tendency and spread for pH detected in the Tank WM-180 liquid residuals.

Analyte	Mean	Median	Standard Deviation	Coefficient of Variation (%)	Interquartile Range	Range
pH	4.6	4.6	0.0	0.0	0.0	0.0

Table 19. Five-number summary for pH detected in the Tank WM-180 liquid residuals.

Analyte	Minimum Value	First Quartile	Median	Third Quartile	Maximum Value
pH	4.6	4.6	4.6	4.6	4.6

#### 7.4.2 Normality of the pH Data

Because all of the points are equal to each other, the points in the normal-quantile plot lie along the same line and the estimated standard deviation is zero. This makes it impossible to perform the Shapiro-Wilk test on the data since it is necessary to divide by the standard deviation to perform the Shapiro-Wilk calculations. Therefore, it is not feasible to determine if the data are normally distributed. However, it is apparent that the pH in the final rinsate is homogeneous since all five measurements are the same; therefore, it can be concluded that the measurements are an accurate measure of the true average pH of the tank final rinsate.

#### 7.4.3 Implementation of the Statistical Test

Results from the previous subsections show that the normality of the pH data cannot be assessed. This is because all five observed values are equal to each other. Thus, the LCL and UCL for the pH data must be estimated at the observed value of 4.6. This is a reasonable estimate of the true mean pH of the tank contents since it is apparent that the tank contents are very homogeneous with respect to pH. Otherwise, it would be virtually impossible to obtain five samples with the same measured pH when the samples are independent of each other. Table 20 lists the LCL, UCL, and the AL for pH detected in tank residuals.

Table 20. Summary of post-decontamination pH in the rinsate of Tank WM-180.

Analyte	Mean	95% LCL	95% UCL	Lower Action Level	Upper Action Level	Action Level Exceeded?
pH	4.6	4.6	4.6	2.0	12.5	No

It is seen from Table 20 that the ALs are not exceeded. Therefore, decontamination goals with respect to pH have been met for Tank WM-180.

### 7.5 Data Assessment for Radionuclides

Samples collected from Tank WM-180 for analysis of radionuclides provided analytical data that are generally of high quality. The data generated were validated according to technical procedures and validation flags were assigned based on established QC criteria. No QC issues that would negatively impact data usability were identified (Portage 2005c, 2005d, 2005e). The reported results and validation flags for radionuclides are shown in Appendix I. Table 21 lists the radionuclides detected in the tank residuals.

Table 21. Radionuclides detected in the Tank WM-180 liquid residuals.

Detected Radionuclides		
$^{241}\text{Am}$	$^{94}\text{Nb}^{\text{a}}$	$^{241}\text{Pu}$
$^{244}\text{Cm}^{\text{a}}$	$^{63}\text{Ni}$	$^{125}\text{Sb}^{\text{b}}$
$^{60}\text{Co}^{\text{a}}$	$^{237}\text{Np}$	$^{99}\text{Tc}$
$^{137}\text{Cs}$	$^{238}\text{Pu}$	Total Sr ( $^{90}\text{Sr}$ )
$^{154}\text{Eu}^{\text{b}}$	$^{239/240}\text{Pu}$	$^{234}\text{U}^{\text{a}}$

a. This analyte was detected in less than three of the five samples; therefore, insufficient data are available to perform meaningful statistics.  
b. This radionuclide was detected in four of the five samples. One-half of the minimum detectable activity was used when the analyte was undetected.

Four radionuclides,  $^{244}\text{Cm}$ ,  $^{60}\text{Co}$ ,  $^{94}\text{Nb}$  and  $^{234}\text{U}$ , were detected in fewer than four of the five samples. An insufficient number of detected data are available for these radionuclides to perform the preliminary data analysis and UCL calculations listed in Tables 22–25. Thus, they are omitted from these tables. However, the largest detected values for these radionuclides are as follows:  $^{244}\text{Cm}$  is 3.71E+01 pCi/L with an inventory level of 3.21E+06 pCi/L,  $^{60}\text{Co}$  is 5.38E+02 pCi/L with an inventory level of 1.40E+07 pCi/L,  $^{94}\text{Nb}$  is 4.67E+01 pCi/L with an associated inventory level of 3.44E+06 pCi/L, and  $^{234}\text{U}$  is 6.41E+01 pCi/L with an associated inventory level of 2.52E+06 pCi/L. Therefore, it can be seen that the mean concentrations of these two radionuclides are conclusively less than the associated inventory levels.

### 7.5.1 Preliminary Data Analysis of Radionuclides

Summary statistics were generated for the radionuclide data. Table 22 lists the measures of central tendency and spread for detected radionuclides, and Table 23 provides the five-number summary for each of the detected radionuclides. In cases when a radionuclide was detected in only four samples, one-half of the corresponding minimum detectable activity was used in place of the non-detected result for the calculations (EPA 2000a). Laboratory results and associated validation flags for radionuclides data presented in this DQA are listed in Appendix I. Plots used in the preliminary data analysis and for test assumption verification are found in Appendix E.

Results of the preliminary data analysis indicate that both  $^{241}\text{Am}$  and total Sr are potentially right-skewed. Both  $^{241}\text{Pu}$  and  $^{125}\text{Sb}$  are potentially left-skewed. No outliers are apparent in the data. Distributional irregularities are discussed further in the next subsection.

Table 22. Summary statistics of central tendency and spread for radionuclides detected in the Tank WM-180 liquid residuals.

Analyte	Mean (pCi/L)	Median (pCi/L)	Standard Deviation (pCi/L)	Coefficient of Variation (%)	Interquartile Range (pCi/L)	Range (pCi/L)
<sup>241</sup> Am	3.28E+02	1.95E+02	3.58E+02	109	6.00E+01	8.29E+02
<sup>137</sup> Cs	4.21E+05	3.85E+05	9.69E+04	23.0	1.54E+05	2.19E+05
<sup>154</sup> Eu <sup>a</sup>	7.58E+01	5.97E+01	5.26E+01	69.4	7.47E+01	1.26E+02
<sup>63</sup> Ni	9.37E+01	9.79E+01	1.91E+01	20.3	2.48E+01	4.66E+01
<sup>237</sup> Np	9.79E+01	9.82E+01	3.92E+01	40.1	4.04E+01	1.00E+02
<sup>238</sup> Pu	3.17E+04	2.86E+04	8.41E+03	26.5	5.60E+03	2.23E+04
<sup>239/240</sup> Pu	5.19E+03	4.59E+03	1.89E+03	36.4	2.08E+03	4.66E+03
<sup>241</sup> Pu	3.97E+04	4.52E+04	9.07E+03	22.9	1.12E+04	2.05E+04
<sup>125</sup> Sb <sup>a</sup>	3.24E+03	3.56E+03	1.82E+03	56.1	9.20E+02	4.77E+03
<sup>99</sup> Tc	2.64E+02	2.46E+02	9.65E+01	36.5	1.53E+02	2.22E+02
Total Sr ( <sup>90</sup> Sr)	3.41E+04	3.30E+04	5.86E+03	17.2	1.40E+03	1.55E+04

a. One-half of the minimum detectable activity was used when the analyte was undetected.

Table 23. Five-number summary for radionuclides detected in the Tank WM-180 liquid residuals.

Analyte	Minimum Value (pCi/L)	First Quartile (pCi/L)	Median (pCi/L)	Third Quartile (pCi/L)	Maximum Value (pCi/L)
<sup>241</sup> Am	1.38E+02	1.40E+02	1.95E+02	2.00E+02	9.67E+02
<sup>137</sup> Cs	3.26E+05	3.48E+05	3.85E+05	5.02E+05	5.45E+05
<sup>154</sup> Eu <sup>a</sup>	1.90E+01 <sup>a</sup>	4.03E+01	5.97E+01	1.15E+02	1.45E+02
<sup>63</sup> Ni	7.24E+01	7.72E+01	9.79E+01	1.02E+02	1.19E+02
<sup>237</sup> Np	5.69E+01	6.86E+01	9.82E+01	1.09E+02	1.57E+02
<sup>238</sup> Pu	2.26E+04	2.85E+04	2.86E+04	3.41E+04	4.49E+04
<sup>239/240</sup> Pu	3.45E+03	3.85E+03	4.59E+03	5.93E+03	8.11E+03
<sup>241</sup> Pu	2.59E+04	3.48E+04	4.52E+04	4.60E+04	4.64E+04
<sup>125</sup> Sb <sup>a</sup>	2.11E+02 <sup>a</sup>	3.27E+03	3.56E+03	4.19E+03	4.98E+03
<sup>99</sup> Tc	1.69E+02	1.81E+02	2.46E+02	3.34E+02	3.91E+02
Total Sr ( <sup>90</sup> Sr)	2.85E+04	3.17E+04	3.30E+04	3.31E+04	4.40E+04

a. One-half of the minimum detectable activity was used when the analyte was undetected.

## 7.5.2 Normality of the Radionuclide Data

Detected radionuclide data are also analyzed using normal-quantile plots and the Shapiro-Wilk test. Results of these methods indicate that all of the radionuclide data appear to be approximately normally distributed with the exception of  $^{241}\text{Am}$ . Thus, bootstrapping was used to compute the UCL for  $^{241}\text{Am}$ . Results of the Shapiro-Wilk test are listed in Table 24.

Table 24. Results of the Shapiro-Wilk test for radionuclides.

Analyte	Test Statistic	p-value	Are Data Normal?
$^{241}\text{Am}$	0.6223	0.0012	No
$^{137}\text{Cs}$	0.8883	0.3487	Yes
$^{154}\text{Eu}^{\text{a}}$	0.9357	0.6359	Yes
$^{63}\text{Ni}$	0.9403	0.6683	Yes
$^{237}\text{Np}$	0.9453	0.7036	Yes
$^{238}\text{Pu}$	0.9254	0.5654	Yes
$^{239/240}\text{Pu}$	0.9086	0.4595	Yes
$^{241}\text{Pu}$	0.8097	0.0970	Yes
$^{125}\text{Sb}^{\text{a}}$	0.8709	0.2702	Yes
$^{99}\text{Tc}$	0.9132	0.4871	Yes
Total Sr ( $^{90}\text{Sr}$ )	0.8243	0.1260	Yes

a. One-half of the minimum detectable activity was used when the analyte was undetected.

## 7.5.3 Implementation of the Statistical Test

No specific regulatory thresholds relative to the activity (i.e., concentrations) exist for the radionuclides left in any one tank after decontamination. Rather, the total inventory of radionuclides remaining in all closed components of the TFF will be evaluated following completion of the TFF decontamination efforts. The PA (DOE-ID 2003) conducted to address the DOE Order 435.1 (2001) closure requirements establishes an inventory of radionuclide concentrations remaining in each tank following decontamination. While this established inventory is not the basis for a decision such as continuing to clean a tank, the inventory concentrations can be compared with the concentrations achieved through decontamination efforts. Because of this, hypothesis testing is not required to make decisions concerning whether decontamination of Tank WM-180 may cease; however, hypothesis testing using the modeled value as the AL provides information on the decontamination effort for the radionuclides. The *t*-test is used to make comparisons of the observed concentrations with the modeled PA except for  $^{241}\text{Am}$ ; the comparison of the  $^{241}\text{Am}$  concentration to the PA was made using the bootstrap method.

Table 25 lists the UCLs for radionuclides and compares them with the PA modeled inventory (DOE-ID 2003). None of these analytes approach the inventory levels. All of the radionuclides were present in the rinsate at an activity that was significantly less than the activity modeled in the PA. The data provide a high degree of confidence in deciding that the decontamination efforts were successful in reducing the activity of all radionuclides to below those modeled in the PA.

Table 25. Summary of post-decontamination activities of radionuclides in the rinsate of Tank WM-180.

Analyte	Mean (pCi/L)	<i>t</i> -value	95% UCL (pCi/L)	Inventory Level (pCi/L)	Action Level Exceeded?
<sup>241</sup> Am	3.28E+02	NA	6.48E+02 <sup>a</sup>	3.60E+07	No
<sup>137</sup> Cs	4.21E+05	2.132	5.14E+05	1.15E+11	No
<sup>154</sup> Eu <sup>a</sup>	7.58E+01	2.132	1.26E+02	1.83E+08	No
<sup>63</sup> Ni	9.37E+01	2.132	1.12E+02	8.70E+07	No
<sup>237</sup> Np	9.79E+01	2.132	1.35E+02	3.43E+05	No
<sup>238</sup> Pu	3.17E+04	2.132	3.98E+04	5.70E+08	No
<sup>239/240</sup> Pu	5.19E+03	2.132	6.99E+03	7.05E+07	No
<sup>241</sup> Pu	3.97E+04	2.132	4.83E+04	4.24E+08	No
<sup>125</sup> Sb <sup>a</sup>	3.24E+03	2.132	4.97E+03	1.49E+06	No
<sup>99</sup> Tc	2.64E+02	2.132	3.56E+02	2.99E+07	No
Total Sr ( <sup>90</sup> Sr)	3.41E+04	2.132	3.96E+04	8.15E+10	No

a. UCL computed using the bootstrap method.

b. One-half of the minimum detectable activity was used when the analyte was undetected.

## **8. SUMMARY OF DATA ANALYSIS FOR THE WM-180 VAULT SUMP**

This section provides the statistical analysis that was performed on the data associated with the WM-180 vault sump. One sample was collected from the vault sump.

Based on the investigation of the data associated with the WM-182 and WM-183 vault sums (ICP 2004b), ancillary equipment samples come from separate populations and cannot be pooled together for analysis. Therefore, the data are most appropriately analyzed in tabular format. The observed data are presented by analyte and with its associated AL so that the results can be directly compared to the ALs. The observed values are also expressed as a percentage of the AL to aid in the comparison. The results are presented in pertinent subsections that follow. Samples were analyzed for all constituents of concern. However, only analytes that were detected are presented in the following subsections. Also, all analytical data were validated in accordance with technical procedures and data validation flags were assigned based on laboratory performance in QC analyses. Data flagged during validation may still be useful for making project decisions. When appropriate, discrepancies in the QC analyses that were noted in the validation process are addressed in the following subsections. All reported results and the corresponding validation flags for the WM-180 vault sump are provided in Appendixes J–M.

### **8.1 Metals Results in the WM-180 Vault Sump**

Metals data were validated in accordance with technical procedures and data validation flags were assigned based on laboratory performance in QC analyses (Portage 2004). The sample result for antimony was flagged “J” (estimated) to denote the potential low bias reflected in low recoveries in the matrix spike and matrix spike duplicate analyses. The matrix spike/matrix spike duplicate recoveries (66.2–73.9%) were only slightly outside the 75–125% acceptance criteria, and the recovery for antimony in the laboratory control sample analysis met the acceptance criteria for accuracy. The usability of the metals data for the WM-180 vault sump is not negatively impacted by the validation flags assigned. All reported metals data and validation flags are listed in Appendix J.

Table 26 presents the reported results of the metals data obtained from the vault sump along with the observed value expressed as a percentage of the AL. It can be seen from Table 26 that none of the observed values are greater than 2% of the AL. Therefore, it can be concluded that concentrations of all metals of concern in the sump do not exceed the associated ALs.

Table 26. Comparison of the reported metals data for the WM-180 vault sump to the corresponding action levels.

Analyte	Observed Value from Sump SR-16 ( $\mu\text{g/L}$ )	Value from Sump SR-16 Expressed as a Percentage of the Action Level (%)	Action Level ( $\mu\text{g/L}$ )
Aluminum	2,070	<1.0	3,100,000
Antimony	47.2	<1.0	63,000
Barium	47.1	<1.0	83,000
Beryllium	0.10	<1.0	5,300
Calcium	199,000	NA	NA
Chromium	10	1.1	900
Cobalt	3.2	<1.0	770,000
Copper	17.1	<1.0	600,000

Table 26. (continued).

Analyte	Observed Value from Sump SR-16 ( $\mu\text{g/L}$ )	Value from Sump SR-16 Expressed as a Percentage of the Action Level (%)	Action Level ( $\mu\text{g/L}$ )
Iron	2,140	<1.0	1,700,000
Lead	53.6	1.34	4,000
Magnesium	7,560	NA	NA
Manganese	65.5	<1.0	490,000
Mercury	0.60	<1.0	160
Nickel	10.7	<1.0	440,000
Potassium	15,100	NA	NA
Sodium	20,500	NA	NA
Vanadium	4.4	<1.0	260,000
Zinc	46.0	<1.0	1,700,000

NA = Not applicable.

## 8.2 Results for Anions in the WM-180 Vault Sump

The anions data were validated in accordance with INL technical procedures and validation flags were assigned to sample based on the laboratory performance on the corresponding QC analyses (Portage 2005a). The reported result for fluoride in Sample CP20020101AN (SR-16) was assigned the validation flag “R” based on a potential high bias reflected in the analytical spike recovery results (236.2%). The fact that the laboratory control sample recovery for fluoride (94.3%) was within the 80–120% recovery requirements indicates that the instrument performance was as expected and the spike results can be attributed to the sample matrix. Any decisions based on these data would be only more conservative. Therefore, the data usability is not negatively impacted by the potential high bias reflected in the analytical spike recovery results.

All reported data and validation flags are shown in Appendix K. Table 27 lists the anion data generated from the vault sums and compares them to the corresponding AL. The observed value is also represented as a percentage of the AL to facilitate comparison. Fluoride is the only anion that has an associated AL. The ratio of the fluoride measurement to the AL is less than 1%, so it can be seen from these data that the concentration of fluoride in the vault sump is well below the AL.

Table 27. Comparison of the anion data obtained from the WM-180 vault sump.

Analyte	Observed Value from Sump SR-16 (mg/L)	Value from Sump SR-16 Expressed as a Percentage of the Action Level (%)	Action Level (mg/L)
Chloride	9.1	NA	NA
Fluoride	0.18	<1.0	770
Nitrate (mg-N/L)	197	NA	NA
Sulfate	38.9	NA	NA

NA = Not applicable.

### **8.3 Results for Organics in the WM-180 Vault Sump**

Samples collected from the WM-180 vault sump were analyzed for VOCs. Data generated from the VOC analyses were validated in accordance with INL technical procedures and validation flags were assigned based on the laboratory performance in the associated QC analyses.

During validation of the VOC data, no QC issues that would negatively impact any data usability were identified (EVAC 2005a; Tetra Tech 2005). Undetected sample results reported for the compounds dichlorodifluoromethane, bromomethane, and trans-1,3-dichloropropene were flagged “UJ” (undetected estimate) based on relative standard deviation during the initial calibration. The percent relative standard deviations (or CVs) for these compounds (21.6%, 20.1%, and 25.8%) exceed the 15% criterion for precision between the six calibration levels. All three compounds were detected in all six calibration levels. Had any of these compounds been present in the samples, a detection would have been made. Also, acetone was reported below the quantitation limit and flagged “J” to denote an estimated value.

The reported results from all the VOC analyses and the corresponding validation flags are shown in Appendix L.

Data for SVOC and PCB analyses were also validated in accordance with INL technical procedures and validation flags were assigned based on the laboratory performance in the associated QC analyses. During the validation of SVOC data (EVAC 2005b), minor issues having minimal impact on data usability were noted. The more significant issues for which the validation qualifying flag “R” (rejected) was assigned are addressed in this report. The surrogate compound recovery results for the Sample CP20020301SV included two acid fraction compounds below their respective control limits. Specifically, the reported recoveries for the surrogate compounds phenol-d5 (0%) and 2-fluorophenol (11%) were outside the acceptable ranges (17–53% and 22–63%, respectively). The recovery of the third acid fraction surrogate compound, 2,4,6-tribromophenol (60%) was within the 41–132% limits. The sample was re-extracted; however, the 7-day holding time specified between sample collection and extraction was exceeded. During validation, the undetected results reported for all acid fraction compounds were rejected based on the missed holding time of the re-extraction and the original phenol-d5 surrogate recovery being less than 10%. However, it is important to note that the original extraction was performed within holding time criteria and that all three acid fraction surrogate recoveries in the re-extraction (although low) exceeded the 10% criterion for rejection. Furthermore, surrogate recovery is not the only performance indicator for the acid fraction compounds. The matrix spike/matrix spike duplicate analyses included five acid fraction compounds for which the recovery results were either within the corresponding control limits or exhibited a potential high bias. It is reasonable that any acid fraction compounds present at significant concentrations would have been detected.

Undetected results for the compound dibenzo(a,h)anthracene were also rejected during validation to denote the potential low bias reflected in the RRF from the initial calibration. Although the RRF for this compound (0.033) was below the validation criterion of 0.05, the compound was detected in all five concentration levels of the initial calibration and in continuing calibration. Therefore, it is reasonable that dibenzo(a,h)anthracene would have been detected had it been present in the samples, and the data usability of the undetected sample results was not negatively impacted.

No issues impacting data usability of the PCB results were noted (EVAC 2005c).

The reported results from all the SVOC and PCB analyses and the corresponding laboratory and validation flags are shown in Appendix L.

Table 28 provides a comparison between the detected organic results and the corresponding ALs. The observed value for each organic compound is listed along with the corresponding AL and the observed values expressed as a percentage of the AL. Each organic is present in concentration less than 1% of the corresponding AL. Therefore, it can be concluded that the vault sumps have met closure standards with respect to VOCs.

Table 28. Comparison of the organics detected in the WM-180 vault sump rinsate to the corresponding ALs.

Analyte	Observed Value from Sump SR-16 ( $\mu\text{g/L}$ )	Value from Sump SR-16 Expressed as a Percentage of the Action Level (%)	Action Level ( $\mu\text{g/L}$ )
2-Butanone (methyl ethyl ketone)	11.5	<1.0	160,000
2-Nitrophenol	1.3	NA	NA
Acetone	6.7	<1.0	990,000
Tri-n-butyl phosphate	111	NA	NA

NA = Not applicable.

## 8.4 Results for pH in the WM-180 Vault Sump

The pH of the post-decontamination residuals collected from the WM-180 vault sump was also measured. The data for pH were validated according to INL technical procedures and no issues with any applicable QC criteria for pH were identified (Portage 2005f).

Table 29 lists the results reported for pH and the corresponding ALs (only the higher AL is listed because the observed pH is basic). The observed value expressed as a percentage of the AL is also listed. The percentage was computed using the difference between the value and 7.0 since it is the neutral value for pH ( $\%AL = [7.5-7.0]*100/[12.5-7.0] = 9.1\%$ ). Laboratory results and associated validation flags for pH data presented in this DQA are listed in Appendix K. It can be seen from the results that pH value has not exceeded its AL.

Table 29. Comparison of the pH data obtained from the WM-180 vault sump with the specified ALs.

Analyte	Observed Value from Sump SR-16	Value from Sump SR-16 Expressed as a Percentage of the Action Level (%)	Action Level
pH	7.5	9.1	12.5

## 8.5 Results for Radionuclides in the WM-180 Vault Sump

Samples collected from the WM-180 vault sump for analysis of radionuclides provided analytical data that are of high quality. The data for radionuclide analyses were validated in accordance with INL technical procedures and validation flags were assigned to sample results based on the established QC criteria. No significant issues in the QC results that would negatively impact data usability were noted (Portage 2005g, 2005h, 2005i). All reported results and the corresponding validation flags are shown in Appendix M. Results for the detected radionuclides are listed in Table 30. All of the measured values for the radionuclides are less than 1% of the inventory level. Therefore, the concentrations of radionuclides in the sump are well below the inventory level.

Table 30. Comparison of the radionuclide data obtained from the WM-180 vault sump with the specified inventory levels.

Analyte	Observed Value from Sump SR-16 (pCi/L)	Value from Sump SR-16 Expressed as a Percentage of the Inventory Level (%)	Inventory Level (pCi/L)
<sup>241</sup> Am	1.92E+01	<1.0	3.60E+07
<sup>14</sup> C	3.26E+01	<1.0	9.90E+07
<sup>137</sup> Cs	1.14E+04	<1.0	1.15E+11
<sup>3</sup> H	3.45E+03	<1.0	1.61E+07
<sup>129</sup> I	1.08E+02	<1.0	7.44E+04
<sup>63</sup> Ni	3.72E+01	<1.0	8.70E+07
<sup>238</sup> Pu	1.06E+02	<1.0	5.70E+08
<sup>239/240</sup> Pu	1.07E+01	<1.0	7.05E+07
<sup>241</sup> Pu	8.89E+01	<1.0	4.24E+08
Total Sr ( <sup>90</sup> Sr)	2.61E+06	<1.0	8.15E+10
<sup>99</sup> Tc	5.13E+01	<1.0	2.99E+07



## **9. CONCLUSIONS**

The data assessed in this report were generated from the sample analysis of residual tank liquids remaining in the tank and the vault sump after decontamination of Tank WM-180. Because decontamination activities reduced the volume of solids remaining in the tank to less than 15% by volume of the total sample collected, the solids portion of the samples collected were not analyzed. The impact of the data quality issues identified during validation on the data usability has been assessed. It was determined that no significant data quality issues that would negatively impact the data usability were identified. The residual tank and vault sump liquids data were assessed, and the statistical results presented in Sections 7 and 8 demonstrate that all closure performance standards were met. It can be concluded that decontamination efforts in Tank WM-180 have been successful.



## 10. REFERENCES

- 40 CFR 261.24, 2005, "Toxicity Characteristic," *Code of Federal Regulations*, Office of the Federal Register, August 25, 2005.
- 42 USC 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976."
- Analyse-it, Version 1.67, Leeds, England: Analyse-It Software, Ltd., January 13, 2003.
- DOE O 435.1, 2001, "Radioactive Waste Management," Change 1, U.S. Department of Energy, August 28, 2001.
- DOE-ID, 2003, *Performance Assessment for the Tank Farm Facility at the Idaho National Engineering and Environmental Laboratory*, DOE/ID-10966, Volumes 1–3, April 2003.
- DOE-ID, 2004, *Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tank WM-180*, DOE/NE-ID-11167, Revision 0, June 2004.
- Efron, B., and R. J. Tibshirani, 1994, *An Introduction to the Bootstrap*, CRC Press, May 1994.
- EVAC, 2005a, *Organic Data Limitations and Validation Report for the Idaho National Engineering and Environmental Laboratory, Post-Decontamination Character of the WM-103, WM-180 Tank Residuals*, Report Number: 05-IN01-0645-CP20020301VG, SDG CP20020301VG, Environmental Validation and Assessment Consultants, Inc., Baltimore, Maryland, March 9, 2005.
- EVAC, 2005b, *Organic Data Limitations and Validation Report for the Idaho National Engineering and Environmental Laboratory, Post-Decontamination Character of the WM-180 Tank Residuals*, Report Number: 05-IN01-0644-CP20020301SV, SDG CP20020301SV, Environmental Validation and Assessment Consultants, Inc., Baltimore, Maryland, March 10, 2005.
- EVAC, 2005c, *Organic Data Limitations and Validation Report for the Idaho National Engineering and Environmental Laboratory, Post Decontamination Character of the WM-180 Tank Residuals*, L&V Report Number: 05-IN01-0643-CP20020301PC, SDG CP200200301PC, Environmental Validation and Assessment Consultants, Inc., Baltimore, Maryland, March 9, 2005.
- EPA, 2000a, *Guidance for Data Quality Assessment, Practical Methods for Data Analysis*, EPA QA/G-9, EPA/600/R-96/084, U.S. Environmental Protection Agency, Office of Environmental Information, Washington D.C., July 2000.
- EPA, 2000b, *Guidance for the Data Quality Objectives Process*, EPA QA/G-4, EPA/600/R-96/055, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C., August 2000.
- ICP, 2004a, *Sampling and Analysis Plan for the Post-Decontamination Characterization of the WM-180 Tank Residuals*, ICP/EXT-04-00357, Rev. 0, June 2004.
- ICP, 2004b, *Data Quality Assessment Report for the Post-Decontamination Characterization of the Ancillary Equipment Associated with Tanks WM-182 and WM-183 at the Idaho Nuclear Technology and Engineering Center Tank Farm Facility*, ICP/EXT-04-00465, Rev. 0, July 2004.

Portage, 2004, *Inorganic Limitations and Validation Report for Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PM0127-12-04, SDG CP20020101XM, Portage, Inc., Idaho Falls, Idaho, December 22, 2004.

Portage, 2005a, *Inorganic Limitations and Validation Report for Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PM0188-02-05, SDG CP20030101XM, Portage, Inc., Idaho Falls, Idaho, February 15, 2005.

Portage, 2005b, *Inorganic Limitations and Validation Report for Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PM0191-03-05, SDG CP20030101AN, Portage, Inc., Idaho Falls, Idaho, March 7, 2005.

Portage, 2005c, *Radioanalytical Data Limitations and Validation Report for the Radiological Analyses of Samples Collected at the INEEL in Support of the Post Decontamination Characterization of WM-180 Tank Residuals*, Report Number: BBWI-PD0116-02-05, SDG CP20030101X4, Portage, Inc., Idaho Falls, Idaho, March 4, 2005.

Portage, 2005d, *Inorganic Limitations and Validation Report for Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PM0212-03-05, SDG CP20030101EA, Portage, Inc., Idaho Falls, Idaho, March 17, 2005.

Portage, 2005e, *Radioanalytical Data Limitations and Validation Report for the Radiological Analyses of Samples Collected at the INEEL in Support of the Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PD0113-03-05R1, SDG CP20030301R8, Portage, Inc., Idaho Falls, Idaho, March 21, 2005.

Portage, 2005f, *Inorganic Limitations and Validation Report for Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PM0136-01-05, SDG CP20020101AN, Portage, Inc., Idaho Falls, Idaho, February 9, 2005.

Portage, 2005g, *Inorganic Limitations and Validation Report for Post-Decontamination of the WM-180 Tank Residuals*, Report Number BBWI-PM0134-01-05, SDG CP20020101, Portage, Inc., Idaho Falls, Idaho, January 10, 2005

Portage, 2005h, *Radioanalytical Data Limitations and Validation Report for the Radiological Analyses of Samples Collected at the INEEL in Support of the Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PD0087-01-05R1, SDG CP20020101R8, Portage, Inc., Idaho Falls, Idaho, April 6, 2005.

Portage, 2005i, *Radioanalytical Data Limitations and Validation Report for the Radiological Analyses of Samples Collected at the INEEL in Support of the Post-Decontamination Characterization of the WM-180 Tank Residuals*, Report Number: BBWI-PD0072-01-05, SDG CP20020101X4, Portage, Inc., Idaho Falls, Idaho, January 6, 2004 [sic]. (The signature and transmittal dates shown on this report should be January 2005 rather than 2004).

S-Plus 2000, Seattle, Washington: Insightful Corporation (previously Mathsoft's Data Analysis Division), 2000.

State of Idaho, 1983, "Hazardous Waste Management," Idaho Statute, Title 39, "Health and Safety," Chapter 44, "Hazardous Waste Management" (also known as the Hazardous Waste Management Act of 1983).

Tetra Tech, 2005, *Organic Data Limitations and Validation Report for the Idaho National Engineering and Environmental Laboratory, Post Decontamination Characterization of the WM-180 Tank Residuals*, L&V Report Number: TTN #0348, SDG CP20020301VA, Tetra Tech NUS, Inc., Pittsburgh, Pennsylvania, March 14, 2005.



## **Appendix A**

### **Graphical Representation of Metals Data**



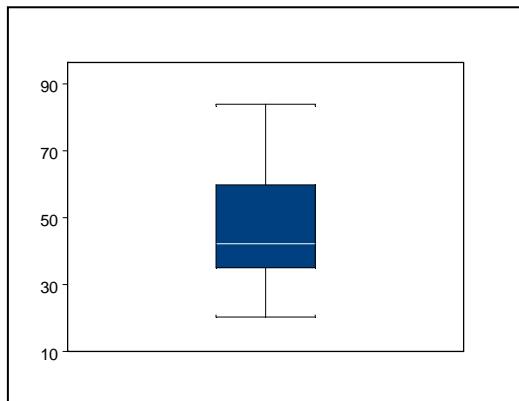


Figure A-1. Boxplot for aluminum data.

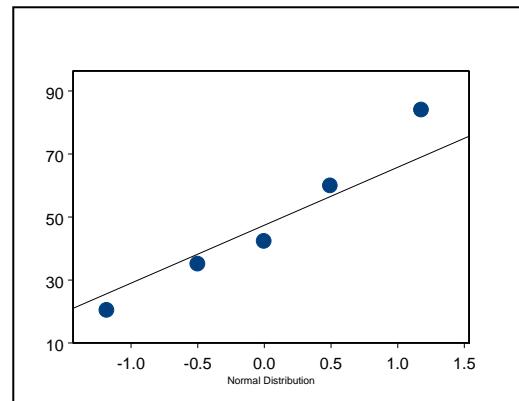


Figure A-2. Normal-quantile plot for aluminum data.

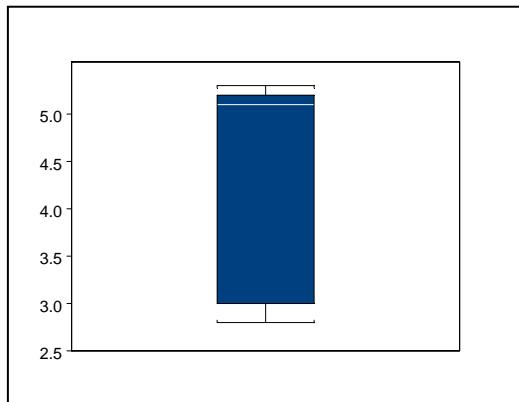


Figure A-3. Boxplot for chromium data.

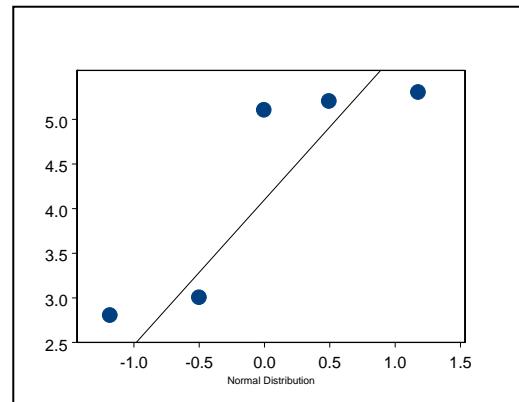


Figure A-4. Normal-quantile plot for chromium data.

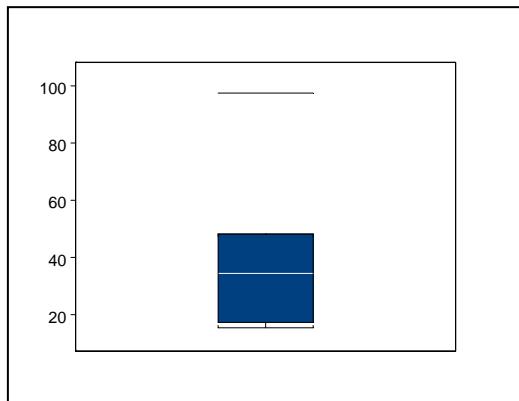


Figure A-5. Boxplot for iron data.

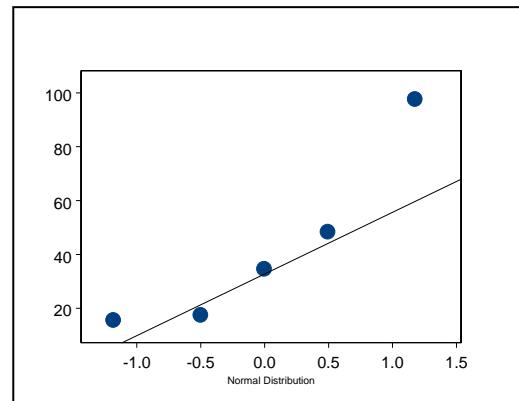


Figure A-6. Normal-quantile plot for iron data.

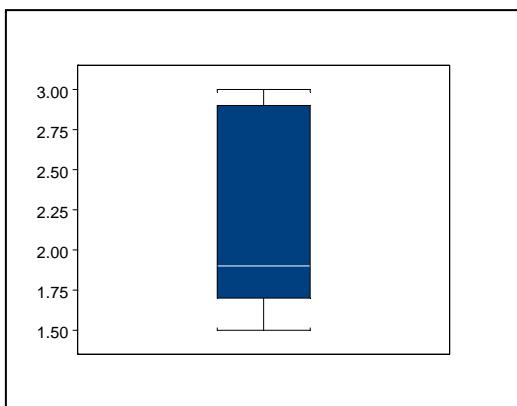


Figure A-7. Boxplot for manganese data.

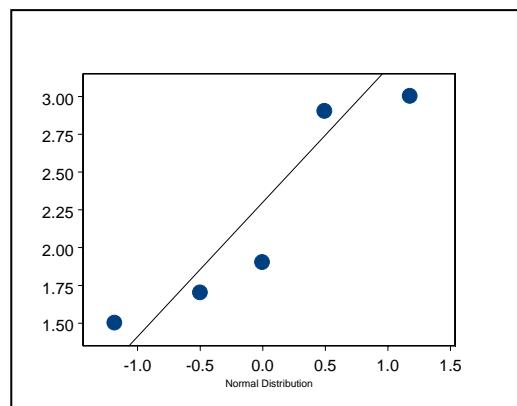


Figure A-8. Normal-quantile plot for manganese data.

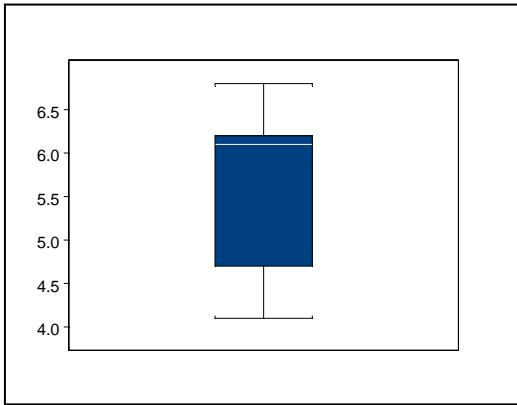


Figure A-9. Boxplot for mercury data.

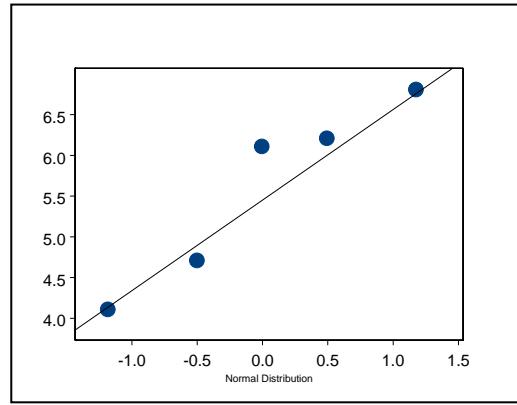


Figure A-10. Normal-quantile plot for mercury data.

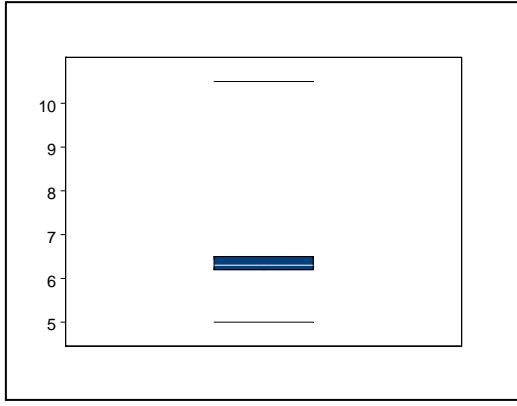


Figure A-11. Boxplot for molybdenum data.

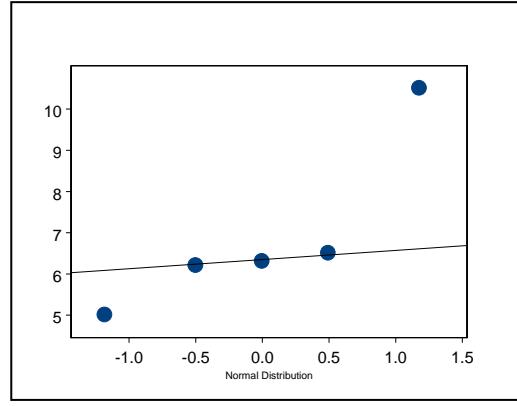


Figure A-12. Normal-quantile plot for molybdenum data.

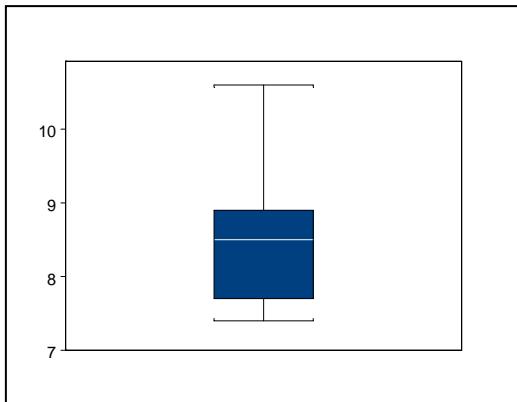


Figure A-13. Boxplot for nickel data.

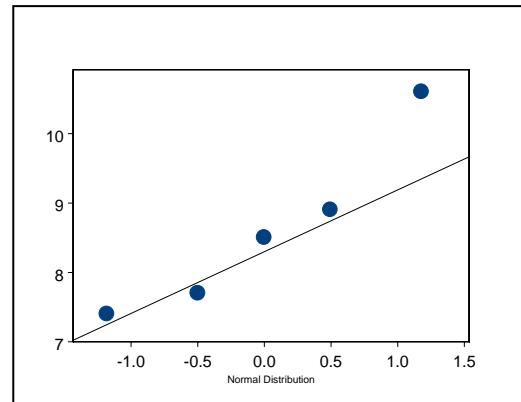


Figure A-14. Normal-quantile plot for nickel data.

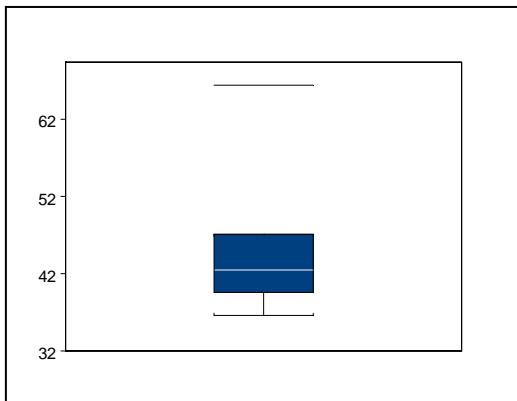


Figure A-15. Boxplot for silver data.

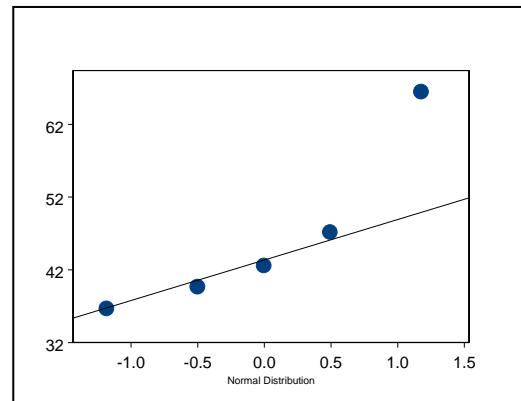


Figure A-16. Normal-quantile plot for silver data.

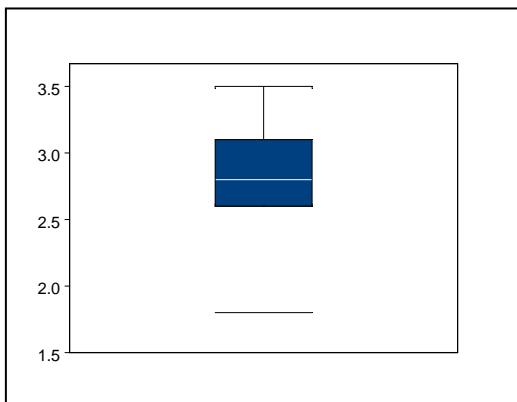


Figure A-17. Boxplot for zinc data.

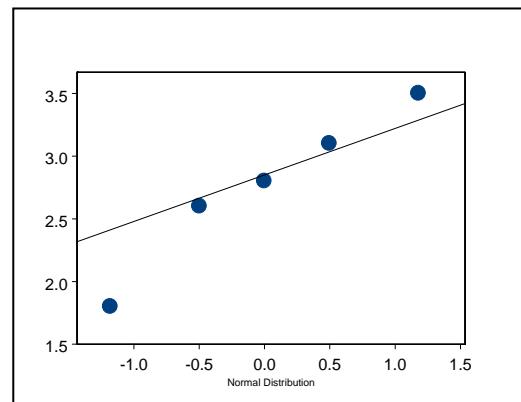


Figure A-18. Normal-quantile plot for zinc data.



**Appendix B**

**Graphical Representation of Anions Data**



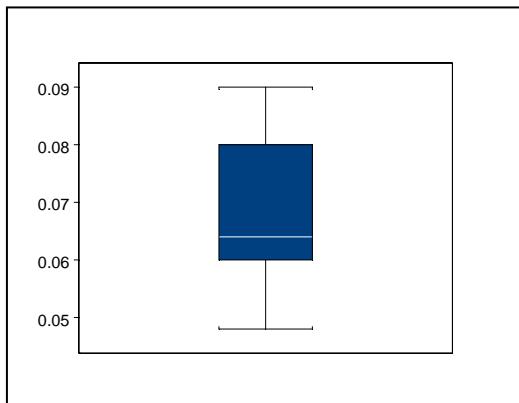


Figure B-1. Boxplot for chloride data.

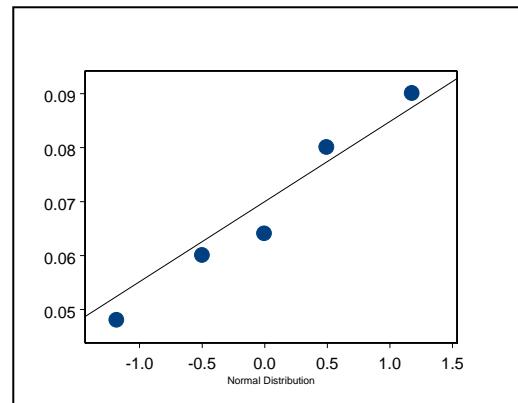


Figure B-2. Normal-quantile plot for chloride data.

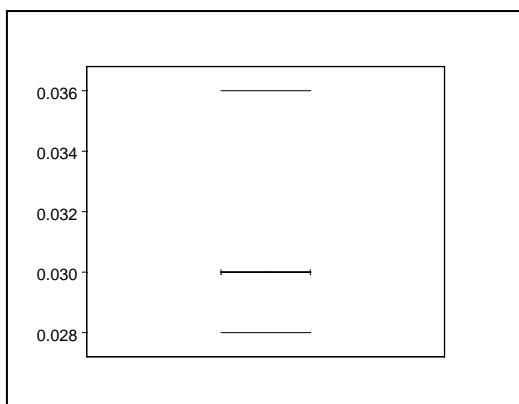


Figure B-3. Boxplot for fluoride data.

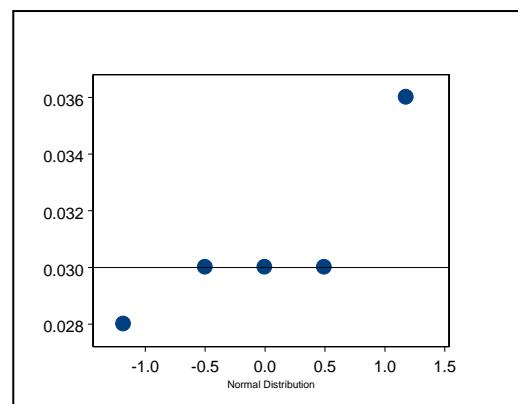


Figure B-4. Normal-quantile plot for fluoride data.

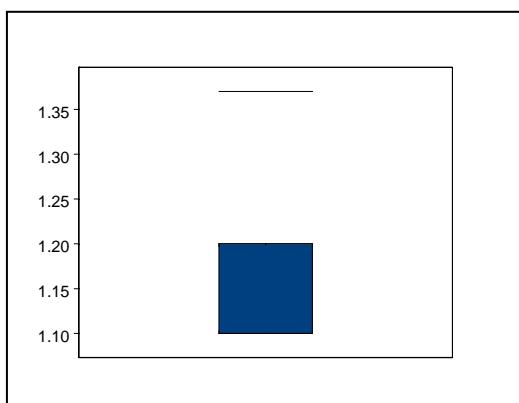


Figure B-5. Boxplot for nitrate data.

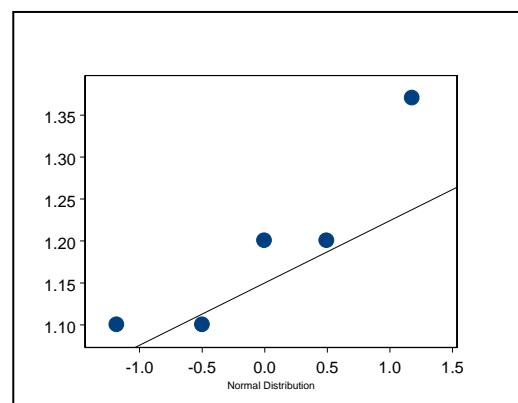


Figure B-6. Normal-quantile plot for nitrate data.

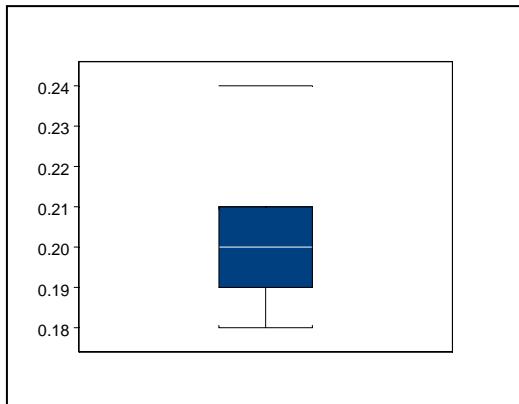


Figure B-7. Boxplot for phosphate data.

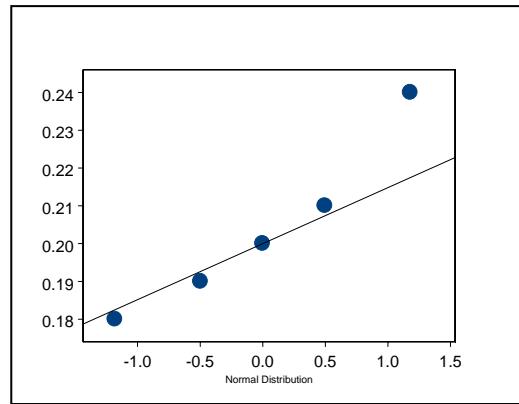


Figure B-8. Normal-quantile plot for phosphate data.

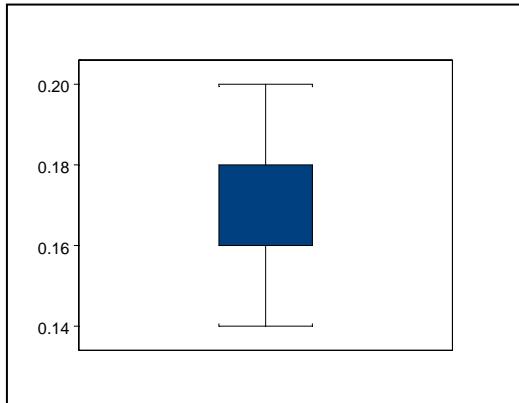


Figure B-9. Boxplot for sulfate data.

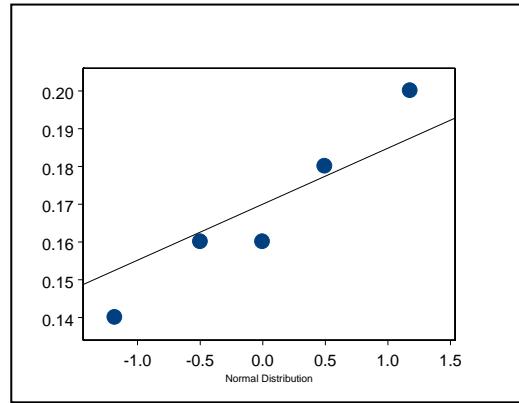


Figure B-10. Normal-quantile plot for sulfate data.

## **Appendix C**

### **Graphical Representation of pH Data**



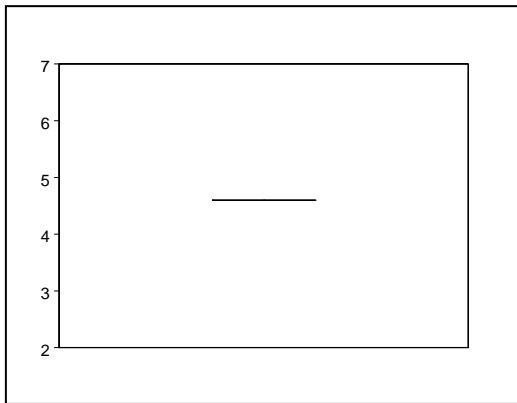


Figure C-1. Boxplot for pH data.

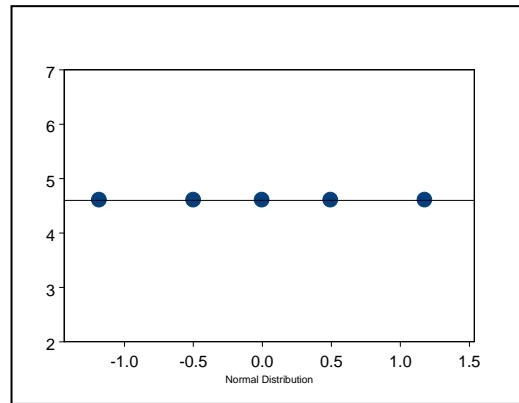


Figure C-2. Normal-quantile plot for pH data.



**Appendix D**

**Graphical Representation of Organic Data**



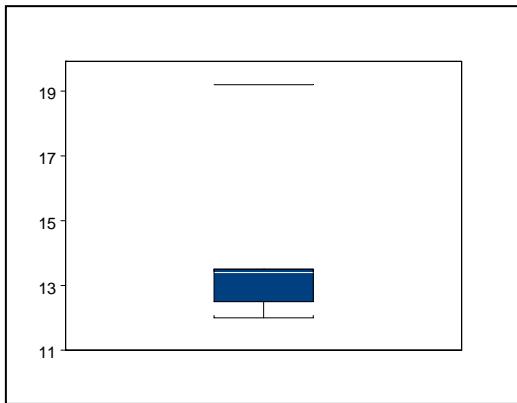


Figure D-1. Boxplot for tri-n-butyl phosphate data.

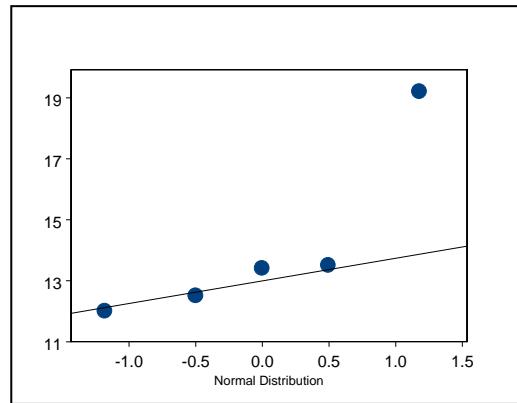


Figure D-2. Normal-quantile plot for tri-n-butyl phosphate data.



## **Appendix E**

### **Graphical Representation of Radionuclide Data**



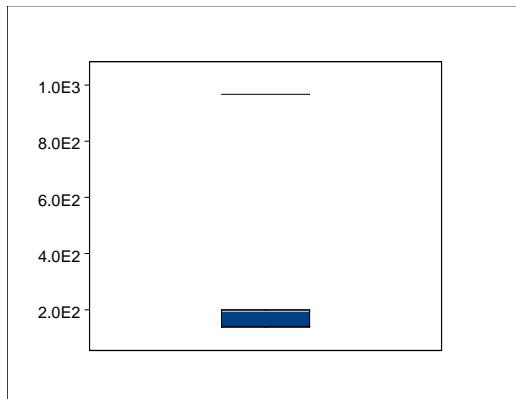


Figure E-1. Boxplot for  $^{241}\text{Am}$  data.

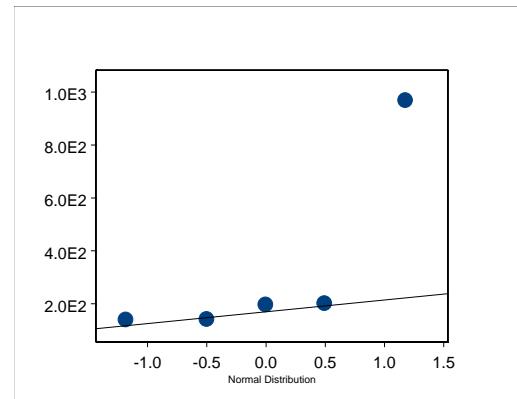


Figure E-2. Normal-quantile plot for  $^{241}\text{Am}$  data.

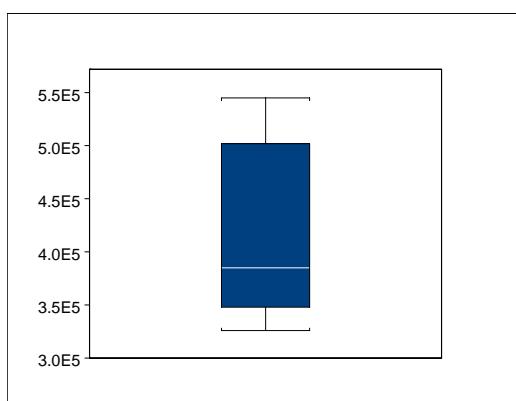


Figure E-3. Boxplot for  $^{137}\text{Cs}$  data.

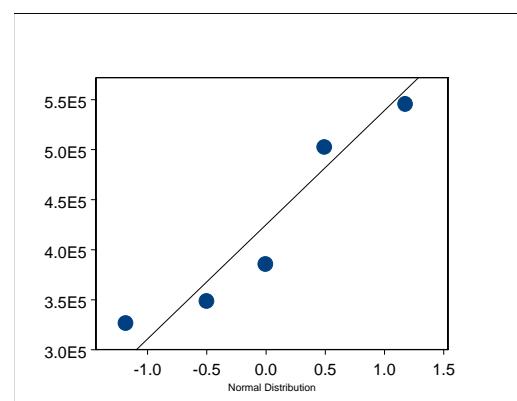


Figure E-4. Normal-quantile plot for  $^{137}\text{Cs}$  data.

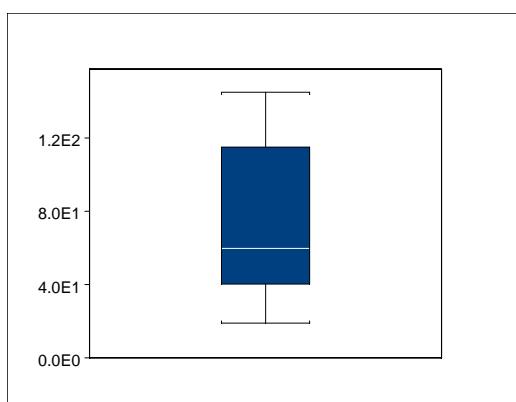


Figure E-5. Boxplot for  $^{154}\text{Eu}$  data.

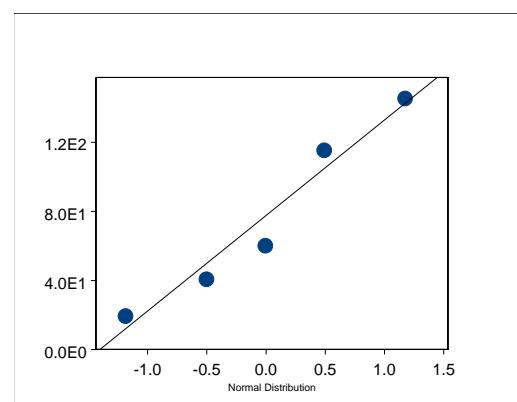


Figure E-6. Normal-quantile plot for  $^{154}\text{Eu}$  data.

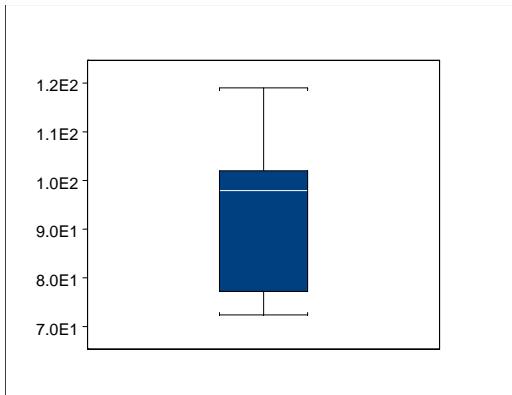


Figure E-7. Boxplot for  $^{63}\text{Ni}$  data.

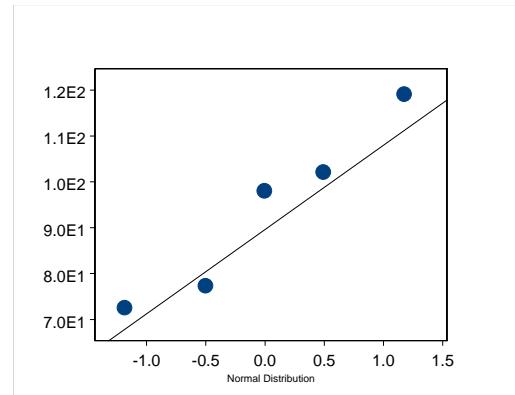


Figure E-8. Normal-quantile plot for  $^{63}\text{Ni}$  data.

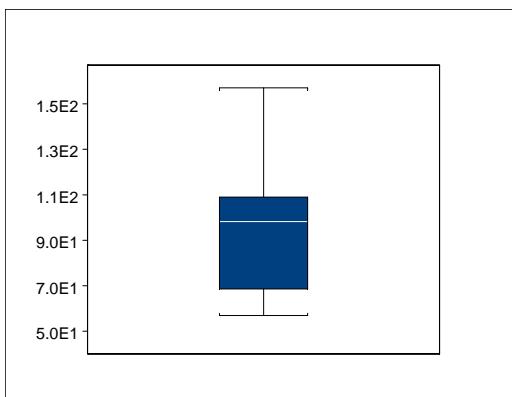


Figure E-9. Boxplot for  $^{237}\text{Np}$  data.

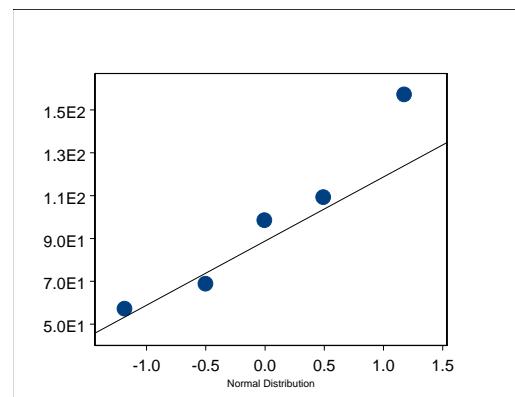


Figure E-10. Normal-quantile plot for  $^{237}\text{Np}$  data.

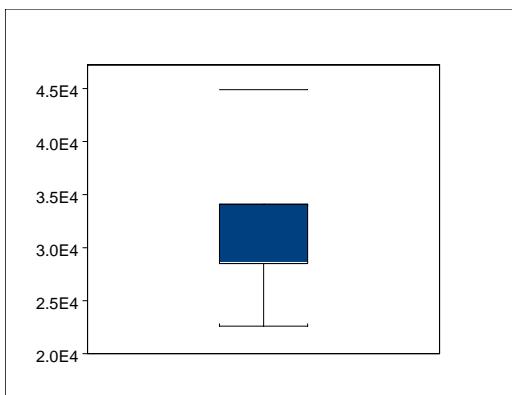


Figure E-11. Boxplot for  $^{238}\text{Pu}$  data.

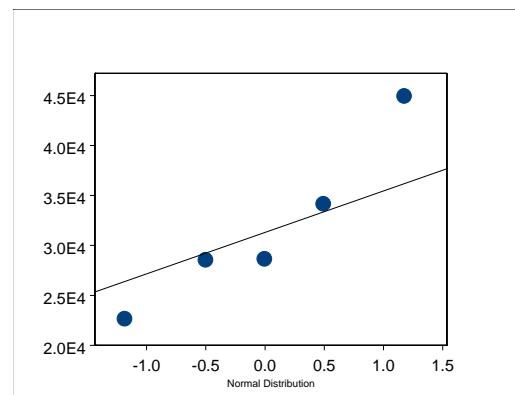


Figure E-12. Normal-quantile plot for  $^{238}\text{Pu}$  data.

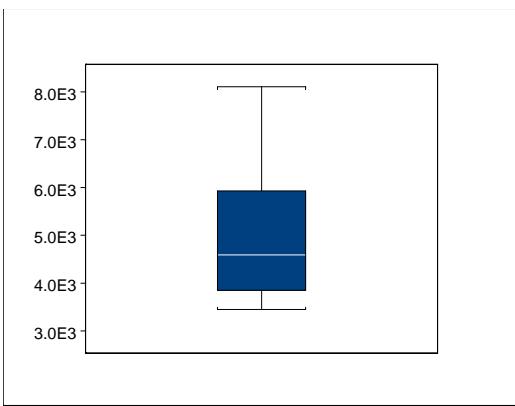


Figure E-13. Boxplot for  $^{239/240}\text{Pu}$  data.

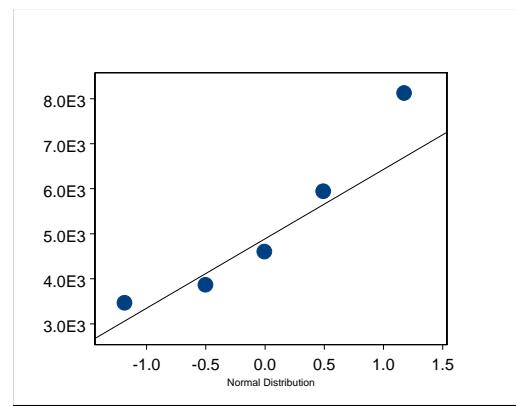


Figure E-14. Normal-quantile plot for  $^{239/240}\text{Pu}$  data.

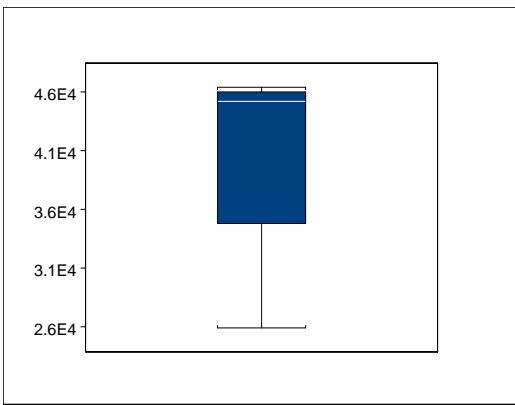


Figure E-15. Boxplot for  $^{241}\text{Pu}$  data.

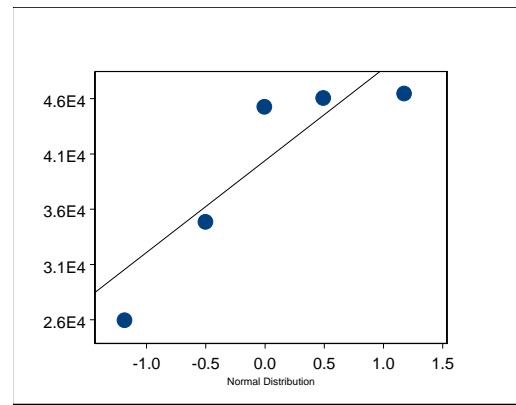


Figure E-16. Normal-quantile plot for  $^{241}\text{Pu}$  data.

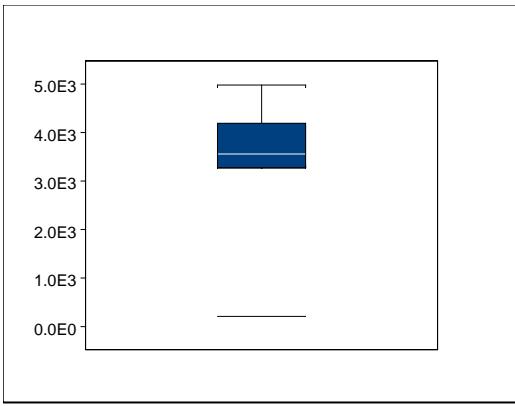


Figure E-17. Boxplot for  $^{125}\text{Sb}$  data.

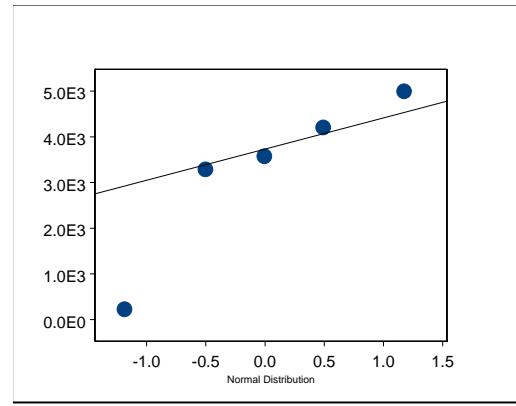


Figure E-18. Normal-quantile plot for  $^{125}\text{Sb}$  data.

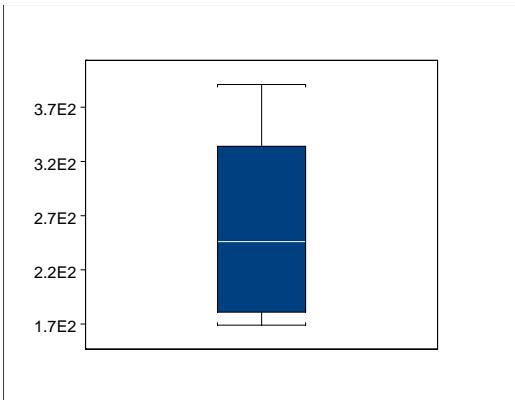


Figure E-19. Boxplot for  $^{99}\text{Tc}$  data.

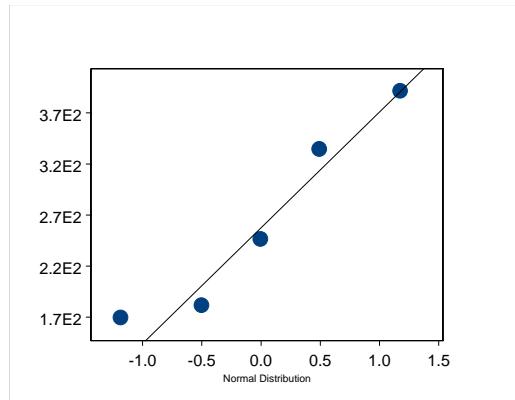


Figure E-20. Normal-quantile plot for  $^{99}\text{Tc}$  data.

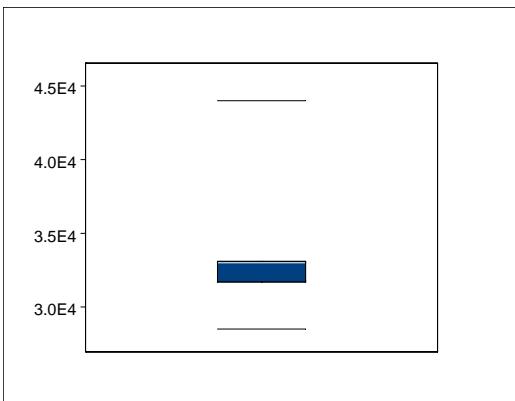


Figure E-21. Boxplot for Total Sr ( $^{90}\text{Sr}$ ) data.

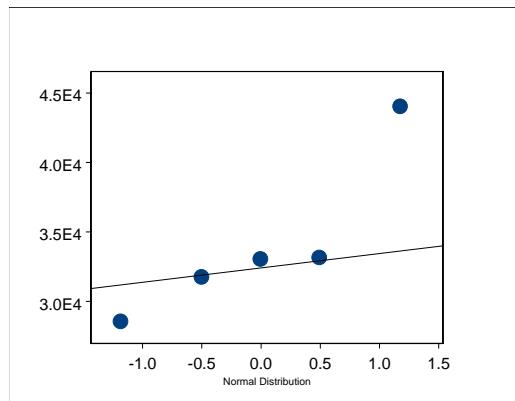


Figure E-22. Normal-quantile plot for Total Sr ( $^{90}\text{Sr}$ ) data.

**Appendix F**

**Reported Results for Tank WM-180 Metals**



Table F-1. Reported results for Tank WM-180 metals.

Field Sample ID	Location	Lab Sample ID	Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7429-90-5	Aluminum	2.03E+01	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7429-90-5	Aluminum	8.39E+01	µg/L	B	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7429-90-5	Aluminum	4.22E+01	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7429-90-5	Aluminum	3.50E+01	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7429-90-5	Aluminum	5.98E+01	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-36-0	Antimony	6.2E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-36-0	Antimony	6.4E+00	µg/L	B	U
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-36-0	Antimony	6.2E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-36-0	Antimony	6.2E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-36-0	Antimony	6.2E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-38-2	Arsenic	2.4E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-38-2	Arsenic	2.4E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-38-2	Arsenic	2.4E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-38-2	Arsenic	2.4E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-38-2	Arsenic	2.4E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-39-3	Barium	6.0E-01	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-39-3	Barium	6.0E-01	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-39-3	Barium	6.0E-01	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-39-3	Barium	6.0E-01	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-39-3	Barium	6.0E-01	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-41-7	Beryllium	1.0E-01	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-41-7	Beryllium	1.0E-01	µg/L	B	U
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-41-7	Beryllium	1.0E-01	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-41-7	Beryllium	1.0E-01	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-41-7	Beryllium	1.0E-01	µg/L	U	

F-3

Figure F-1. (continued).

Field Sample ID	Location	Lab Sample ID	Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-43-9	Cadmium	6.0E-01	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-43-9	Cadmium	6.0E-01	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-43-9	Cadmium	6.0E-01	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-43-9	Cadmium	6.0E-01	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-43-9	Cadmium	6.0E-01	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-70-2	Calcium	3.20E+01	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-70-2	Calcium	2.21E+01	µg/L	B	U
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-70-2	Calcium	2.00E+01	µg/L	B	U
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-70-2	Calcium	2.34E+01	µg/L	B	U
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-70-2	Calcium	2.32E+01	µg/L	B	U
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-47-3	Chromium	2.8E+00	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-47-3	Chromium	5.1E+00	µg/L	B	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-47-3	Chromium	3.0E+00	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-47-3	Chromium	5.2E+00	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-47-3	Chromium	5.3E+00	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-48-4	Cobalt	1.2E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-48-4	Cobalt	1.2E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-48-4	Cobalt	1.2E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-48-4	Cobalt	1.2E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-48-4	Cobalt	1.2E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-50-8	Copper	1.2E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-50-8	Copper	1.2E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-50-8	Copper	1.2E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-50-8	Copper	1.2E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-50-8	Copper	1.2E+00	µg/L	U	

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Figure F-1. (continued).

Field Sample ID	Location	Lab Sample ID	Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-89-6	Iron	1.54E+01	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-89-6	Iron	9.75E+01	µg/L		
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-89-6	Iron	1.73E+01	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-89-6	Iron	3.44E+01	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-89-6	Iron	4.82E+01	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-92-1	Lead	6.0E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-92-1	Lead	6.0E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-92-1	Lead	6.0E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-92-1	Lead	6.0E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-92-1	Lead	6.0E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-95-4	Magnesium	1.60E+01	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-95-4	Magnesium	1.60E+01	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-95-4	Magnesium	1.60E+01	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-95-4	Magnesium	1.60E+01	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-95-4	Magnesium	1.60E+01	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-96-5	Manganese	1.5E+00	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-96-5	Manganese	3.0E+00	µg/L		
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-96-5	Manganese	1.7E+00	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-96-5	Manganese	1.9E+00	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-96-5	Manganese	2.9E+00	µg/L		
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-97-6	Mercury	4.1E+00	µg/L		
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-97-6	Mercury	6.8E+00	µg/L		
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-97-6	Mercury	6.1E+00	µg/L		
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-97-6	Mercury	4.7E+00	µg/L		
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-97-6	Mercury	6.2E+00	µg/L		

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Figure F-1. (continued).

Field Sample ID	Location	Lab Sample ID	Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7439-98-7	Molybdenum	6.3E+00	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7439-98-7	Molybdenum	1.05E+01	µg/L	B	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7439-98-7	Molybdenum	6.5E+00	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7439-98-7	Molybdenum	5.0E+00	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7439-98-7	Molybdenum	6.2E+00	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-02-0	Nickel	7.7E+00	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-02-0	Nickel	1.06E+01	µg/L	B	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-02-0	Nickel	7.4E+00	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-02-0	Nickel	8.5E+00	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-02-0	Nickel	8.9E+00	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-09-7	Potassium	4.47E+01	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-09-7	Potassium	4.47E+01	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-09-7	Potassium	4.47E+01	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-09-7	Potassium	6.00E+01	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-09-7	Potassium	6.21E+01	µg/L	B	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-22-4	Silver	3.66E+01	µg/L		
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-22-4	Silver	6.64E+01	µg/L		
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-22-4	Silver	4.25E+01	µg/L		
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-22-4	Silver	3.96E+01	µg/L		
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-22-4	Silver	4.71E+01	µg/L		

Figure F-1. (continued).

Field Sample ID	Location	Lab Sample ID	Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-23-5	Sodium	3.52E+02	µg/L		U
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-23-5	Sodium	3.65E+02	µg/L		U
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-23-5	Sodium	3.58E+02	µg/L		U
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-23-5	Sodium	3.69E+02	µg/L		U
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-23-5	Sodium	3.62E+02	µg/L		U
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-28-0	Thallium	6.4E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-28-0	Thallium	6.4E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-28-0	Thallium	6.4E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-28-0	Thallium	6.4E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-28-0	Thallium	6.4E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-62-2	Vanadium	1.6E+00	µg/L	U	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-62-2	Vanadium	1.6E+00	µg/L	U	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-62-2	Vanadium	1.6E+00	µg/L	U	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-62-2	Vanadium	1.6E+00	µg/L	U	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-62-2	Vanadium	1.6E+00	µg/L	U	
CP20030101XM	WM-180 TR-45	5AA59	Inorganic	7440-66-6	Zinc	2.8E+00	µg/L	B	
CP20030201XM	WM-180 TR-46	5AA60	Inorganic	7440-66-6	Zinc	3.5E+00	µg/L	B	
CP20030301XM	WM-180 TR-47	5AA61	Inorganic	7440-66-6	Zinc	1.8E+00	µg/L	B	
CP20030401XM	WM-180 TR-15	5AA62	Inorganic	7440-66-6	Zinc	3.1E+00	µg/L	B	
CP20030501XM	WM-180 TR-46	5AA63	Inorganic	7440-66-6	Zinc	2.6E+00	µg/L	B	

a. Laboratory flags:

B = Analyte was below the required detection limit but greater than or equal to the instrument detection limit

U = Analyte was analyzed for but not detected.

b. Validator flags:

U = Undetected.



**Appendix G**

**Reported Results for Tank WM-180 pH and Anions**



Table G-1. Reported results for Tank WM-180 pH and anions.

Field Sample ID	Location	Lab Sample ID	Analysis Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101AN	WM-180 TR-45	5AA49	Inorganic	16887-00-6	Chloride	0.06	mg/L		
CP20030201AN	WM-180 TR-46	5AA50	Inorganic	16887-00-6	Chloride	0.08	mg/L		
CP20030301AN	WM-180 TR-47	5AA51	Inorganic	16887-00-6	Chloride	0.09	mg/L		
CP20030401AN	WM-180 TR-15	5AA52	Inorganic	16887-00-6	Chloride	0.064	mg/L		
CP20030501AN	WM-180 TR-46	5AA53	Inorganic	16887-00-6	Chloride	0.048	mg/L		
CP20030101AN	WM-180 TR-45	5AA49	Inorganic	16984-48-8	Fluoride	0.03	mg/L		
CP20030201AN	WM-180 TR-46	5AA50	Inorganic	16984-48-8	Fluoride	0.03	mg/L		
CP20030301AN	WM-180 TR-47	5AA51	Inorganic	16984-48-8	Fluoride	0.03	mg/L		
CP20030401AN	WM-180 TR-15	5AA52	Inorganic	16984-48-8	Fluoride	0.028	mg/L		
CP20030501AN	WM-180 TR-46	5AA53	Inorganic	16984-48-8	Fluoride	0.036	mg/L		
CP20030101AN	WM-180 TR-45	5AA49	Inorganic	14797-55-8	Nitrate	1.1	mg/L		
CP20030201AN	WM-180 TR-46	5AA50	Inorganic	14797-55-8	Nitrate	1.1	mg/L		
CP20030301AN	WM-180 TR-47	5AA51	Inorganic	14797-55-8	Nitrate	1.2	mg/L		
CP20030401AN	WM-180 TR-15	5AA52	Inorganic	14797-55-8	Nitrate	1.2	mg/L		
CP20030501AN	WM-180 TR-46	5AA53	Inorganic	14797-55-8	Nitrate	1.37	mg/L		
CP20030101PH	WM-180 TR-45	5AA54	Inorganic	10-29-7	pH	4.6	pH units		
CP20030201PH	WM-180 TR-46	5AA55	Inorganic	10-29-7	pH	4.6	pH units		
CP20030301PH	WM-180 TR-47	5AA56	Inorganic	10-29-7	pH	4.6	pH units		
CP20030401PH	WM-180 TR-15	5AA57	Inorganic	10-29-7	pH	4.6	pH units		
CP20030501PH	WM-180 TR-46	5AA58	Inorganic	10-29-7	pH	4.6	pH units		
CP20030101AN	WM-180 TR-45	5AA49	Inorganic	*PHOSPHATE	Phosphate	0.19	mg/L		
CP20030201AN	WM-180 TR-46	5AA50	Inorganic	*PHOSPHATE	Phosphate	0.24	mg/L		
CP20030301AN	WM-180 TR-47	5AA51	Inorganic	*PHOSPHATE	Phosphate	0.21	mg/L		
CP20030401AN	WM-180 TR-15	5AA52	Inorganic	*PHOSPHATE	Phosphate	0.20	mg/L		
CP20030501AN	WM-180 TR-46	5AA53	Inorganic	*PHOSPHATE	Phosphate	0.18	mg/L		

Table G-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis Type	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101AN	WM-180 TR-45	5AA49	Inorganic	14808-79-8	Sulfate	0.18	mg/L		
CP20030201AN	WM-180 TR-46	5AA50	Inorganic	14808-79-8	Sulfate	0.20	mg/L		
CP20030301AN	WM-180 TR-47	5AA51	Inorganic	14808-79-8	Sulfate	0.16	mg/L		
CP20030401AN	WM-180 TR-15	5AA52	Inorganic	14808-79-8	Sulfate	0.16	mg/L		
CP20030501AN	WM-180 TR-46	5AA53	Inorganic	14808-79-8	Sulfate	0.14	mg/L		

a. No laboratory flags were assigned to these data.

b. No validation flags were assigned to these data.

**Appendix H**

**Reported Results for Tank WM-180 Organics**



Table H-1. Reported results for Tank WM-180 volatile organic compounds.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101VG	WM-180 TR-45	0501010-14	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030201VG	WM-180 TR-46	0501010-10	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030601VG	Trip Blank	0501010-09	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	78-93-3	2-Butanone	1.1	µg/L	J	J
CP20030501VG	WM-180 TR-46	0501029-01	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	78-93-3	2-Butanone	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	67-64-1	Acetone	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030301VG	WM-180 TR-47	0501010-05	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	67-64-1	Acetone	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-25-2	Bromoform	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030701VG	Trip Blank	0501029-05	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030201VG	WM-180 TR-46	0501010-10	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030301VG	WM-180 TR-47	0501010-05	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030401VG	WM-180 TR-15	0501010-18	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030501VG	WM-180 TR-46	0501029-01	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030601VG	Trip Blank	0501010-09	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030701VG	Trip Blank	0501029-05	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	

Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030401VG	WM-180 TR-15	0501010-18	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	74-87-3	Chloromethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	74-87-3	Chloromethane	10.0	µg/L	U	

Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101VG	WM-180 TR-45	0501010-14	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030501VG	WM-180 TR-46	0501029-01	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030601VG	Trip Blank	0501010-09	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030701VG	Trip Blank	0501029-05	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20030101VG	WM-180 TR-45	0501010-14	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030201VG	WM-180 TR-46	0501010-10	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030601VG	Trip Blank	0501010-09	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20030101VA	WM-180 TR-45	0501010-15	Methanol	67-56-1	Methanol	20.0	mg/L	U	
CP20030201VA	WM-180 TR-46	0501010-11	Methanol	67-56-1	Methanol	20.0	mg/L	U	
CP20030301VA	WM-180 TR-47	0501010-06	Methanol	67-56-1	Methanol	20.0	mg/L	U	
CP20030401VA	WM-180 TR-15	0501010-19	Methanol	67-56-1	Methanol	20.0	mg/L	U	
CP20030501VA	WM-180 TR-46	0501029-02	Methanol	67-56-1	Methanol	20.0	mg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	108-88-3	Toluene	10.0	µg/L	U	

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Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030201VG	WM-180 TR-46	0501010-10	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030201VG	WM-180 TR-46	0501010-10	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030301VG	WM-180 TR-47	0501010-05	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030401VG	WM-180 TR-15	0501010-18	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030501VG	WM-180 TR-46	0501029-01	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030601VG	Trip Blank	0501010-09	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030701VG	Trip Blank	0501029-05	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20030101VG	WM-180 TR-45	0501010-14	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	

Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030601VG	Trip Blank	0501010-09	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20030101VG	WM-180 TR-45	0501010-14	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030201VG	WM-180 TR-46	0501010-10	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030301VG	WM-180 TR-47	0501010-05	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030401VG	WM-180 TR-15	0501010-18	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030501VG	WM-180 TR-46	0501029-01	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030601VG	Trip Blank	0501010-09	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	
CP20030701VG	Trip Blank	0501029-05	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	

Table H-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
a. Laboratory flags:									
J = Analyte was detected but was less than the quantitation limit.									
U = Analyte was not detected. Quantitation limit is reported.									
b. Validator flags:									
J = Estimated									
UJ = Undetected estimated.									

Table H-2. Reported results for Tank WM-180 semivolatile organic compounds.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	92-52-4	1,1'-Biphenyl	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	92-52-4	1,1'-Biphenyl	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	92-52-4	1,1'-Biphenyl	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	92-52-4	1,1'-Biphenyl	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	92-52-4	1,1'-Biphenyl	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	95-95-4	2,4,5-Trichlorophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	95-95-4	2,4,5-Trichlorophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	95-95-4	2,4,5-Trichlorophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	95-95-4	2,4,5-Trichlorophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	95-95-4	2,4,5-Trichlorophenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	88-06-2	2,4,6-Trichlorophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	88-06-2	2,4,6-Trichlorophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	88-06-2	2,4,6-Trichlorophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	88-06-2	2,4,6-Trichlorophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	88-06-2	2,4,6-Trichlorophenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	120-83-2	2,4-Dichlorophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	120-83-2	2,4-Dichlorophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	120-83-2	2,4-Dichlorophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	120-83-2	2,4-Dichlorophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	120-83-2	2,4-Dichlorophenol	11.4	µg/L	U	

Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	105-67-9	2,4-Dimethylphenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	105-67-9	2,4-Dimethylphenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	105-67-9	2,4-Dimethylphenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	105-67-9	2,4-Dimethylphenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	105-67-9	2,4-Dimethylphenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	51-28-5	2,4-Dinitrophenol	11.4	µg/L	U	UJ
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	51-28-5	2,4-Dinitrophenol	11.0	µg/L	U	UJ
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	51-28-5	2,4-Dinitrophenol	1.3	µg/L	J	J
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	51-28-5	2,4-Dinitrophenol	10.1	µg/L	U	UJ
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	51-28-5	2,4-Dinitrophenol	11.4	µg/L	U	UJ
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	121-14-2	2,4-Dinitrotoluene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	121-14-2	2,4-Dinitrotoluene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	121-14-2	2,4-Dinitrotoluene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	121-14-2	2,4-Dinitrotoluene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	121-14-2	2,4-Dinitrotoluene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	606-20-2	2,6-Dinitrotoluene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	606-20-2	2,6-Dinitrotoluene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	606-20-2	2,6-Dinitrotoluene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	606-20-2	2,6-Dinitrotoluene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	606-20-2	2,6-Dinitrotoluene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	91-58-7	2-Chloronaphthalene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	91-58-7	2-Chloronaphthalene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	91-58-7	2-Chloronaphthalene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	91-58-7	2-Chloronaphthalene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	91-58-7	2-Chloronaphthalene	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	95-57-8	2-Chlorophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	95-57-8	2-Chlorophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	95-57-8	2-Chlorophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	95-57-8	2-Chlorophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	95-57-8	2-Chlorophenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	91-57-6	2-Methylnaphthalene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	91-57-6	2-Methylnaphthalene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	91-57-6	2-Methylnaphthalene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	91-57-6	2-Methylnaphthalene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	91-57-6	2-Methylnaphthalene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	95-48-7	2-Methylphenol (o-Cresol)	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	95-48-7	2-Methylphenol (o-Cresol)	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	95-48-7	2-Methylphenol (o-Cresol)	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	95-48-7	2-Methylphenol (o-Cresol)	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	95-48-7	2-Methylphenol (o-Cresol)	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	88-74-4	2-Nitroaniline	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	88-74-4	2-Nitroaniline	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	88-74-4	2-Nitroaniline	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	88-74-4	2-Nitroaniline	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	88-74-4	2-Nitroaniline	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	88-75-5	2-Nitrophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	88-75-5	2-Nitrophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	88-75-5	2-Nitrophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	88-75-5	2-Nitrophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	88-75-5	2-Nitrophenol	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	91-94-1	3,3'-Dichlorobenzidine	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	91-94-1	3,3'-Dichlorobenzidine	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	91-94-1	3,3'-Dichlorobenzidine	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	91-94-1	3,3'-Dichlorobenzidine	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	91-94-1	3,3'-Dichlorobenzidine	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	99-09-2	3-Nitroaniline	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	99-09-2	3-Nitroaniline	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	99-09-2	3-Nitroaniline	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	99-09-2	3-Nitroaniline	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	99-09-2	3-Nitroaniline	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	101-55-3	4-Bromophenyl phenyl ether	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	101-55-3	4-Bromophenyl phenyl ether	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	101-55-3	4-Bromophenyl phenyl ether	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	101-55-3	4-Bromophenyl phenyl ether	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	101-55-3	4-Bromophenyl phenyl ether	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	59-50-7	4-Chloro-3-methylphenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	59-50-7	4-Chloro-3-methylphenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	59-50-7	4-Chloro-3-methylphenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	59-50-7	4-Chloro-3-methylphenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	59-50-7	4-Chloro-3-methylphenol	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	106-47-8	4-Chloroaniline	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	106-47-8	4-Chloroaniline	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	106-47-8	4-Chloroaniline	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	106-47-8	4-Chloroaniline	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	106-47-8	4-Chloroaniline	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	106-44-5	4-Methylphenol (p-Cresol)	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	106-44-5	4-Methylphenol (p-Cresol)	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	106-44-5	4-Methylphenol (p-Cresol)	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	106-44-5	4-Methylphenol (p-Cresol)	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	106-44-5	4-Methylphenol (p-Cresol)	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	100-01-6	4-Nitroaniline	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	100-01-6	4-Nitroaniline	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	100-01-6	4-Nitroaniline	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	100-01-6	4-Nitroaniline	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	100-01-6	4-Nitroaniline	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	100-02-7	4-Nitrophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	100-02-7	4-Nitrophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	100-02-7	4-Nitrophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	100-02-7	4-Nitrophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	100-02-7	4-Nitrophenol	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	83-32-9	Acenaphthene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	83-32-9	Acenaphthene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	83-32-9	Acenaphthene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	83-32-9	Acenaphthene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	83-32-9	Acenaphthene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	208-96-8	Acenaphthylene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	208-96-8	Acenaphthylene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	208-96-8	Acenaphthylene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	208-96-8	Acenaphthylene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	208-96-8	Acenaphthylene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	98-86-2	Acetophenone	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	98-86-2	Acetophenone	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	98-86-2	Acetophenone	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	98-86-2	Acetophenone	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	98-86-2	Acetophenone	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	120-12-7	Anthracene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	120-12-7	Anthracene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	120-12-7	Anthracene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	120-12-7	Anthracene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	120-12-7	Anthracene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	1912-24-9	Atrazine	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	1912-24-9	Atrazine	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	1912-24-9	Atrazine	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	1912-24-9	Atrazine	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	1912-24-9	Atrazine	11.4	µg/L	U	

Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	100-52-7	Benzaldehyde	11.4	µg/L	U	UJ
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	100-52-7	Benzaldehyde	11.0	µg/L	U	UJ
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	100-52-7	Benzaldehyde	10.9	µg/L	U	UJ
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	100-52-7	Benzaldehyde	10.1	µg/L	U	UJ
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	100-52-7	Benzaldehyde	11.4	µg/L	U	UJ
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	56-55-3	Benzo(a)anthracene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	56-55-3	Benzo(a)anthracene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	56-55-3	Benzo(a)anthracene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	56-55-3	Benzo(a)anthracene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	56-55-3	Benzo(a)anthracene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	50-32-8	Benzo(a)pyrene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	50-32-8	Benzo(a)pyrene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	50-32-8	Benzo(a)pyrene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	50-32-8	Benzo(a)pyrene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	50-32-8	Benzo(a)pyrene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	205-99-2	Benzo(b)fluoranthene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	205-99-2	Benzo(b)fluoranthene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	205-99-2	Benzo(b)fluoranthene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	205-99-2	Benzo(b)fluoranthene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	205-99-2	Benzo(b)fluoranthene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	191-24-2	Benzo(g,h,i)perylene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	191-24-2	Benzo(g,h,i)perylene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	191-24-2	Benzo(g,h,i)perylene	1.2 <sup>c</sup>	µg/L	J	J
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	191-24-2	Benzo(g,h,i)perylene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	191-24-2	Benzo(g,h,i)perylene	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	207-08-9	Benzo(k)fluoranthene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	207-08-9	Benzo(k)fluoranthene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	207-08-9	Benzo(k)fluoranthene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	207-08-9	Benzo(k)fluoranthene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	207-08-9	Benzo(k)fluoranthene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	111-91-1	bis-(2-chloroethoxy)methane	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	111-91-1	bis-(2-chloroethoxy)methane	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	111-91-1	bis-(2-chloroethoxy)methane	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	111-91-1	bis-(2-chloroethoxy)methane	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	111-91-1	bis-(2-chloroethoxy)methane	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	111-44-4	bis-(2-Chloroethyl)ether	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	111-44-4	bis-(2-Chloroethyl)ether	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	111-44-4	bis-(2-Chloroethyl)ether	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	111-44-4	bis-(2-Chloroethyl)ether	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	111-44-4	bis-(2-Chloroethyl)ether	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	74.6 <sup>d</sup>	µg/L		
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	85-68-7	Butyl benzyl phthalate	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	85-68-7	Butyl benzyl phthalate	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	85-68-7	Butyl benzyl phthalate	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	85-68-7	Butyl benzyl phthalate	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	85-68-7	Butyl benzyl phthalate	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	105-60-2	Caprolactam	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	105-60-2	Caprolactam	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	105-60-2	Caprolactam	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	105-60-2	Caprolactam	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	105-60-2	Caprolactam	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	86-74-8	Carbazole	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	86-74-8	Carbazole	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	86-74-8	Carbazole	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	86-74-8	Carbazole	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	86-74-8	Carbazole	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	218-01-9	Chrysene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	218-01-9	Chrysene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	218-01-9	Chrysene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	218-01-9	Chrysene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	218-01-9	Chrysene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	53-70-3	Dibenzo(a,h)anthracene	11.4	µg/L	U	R
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	53-70-3	Dibenzo(a,h)anthracene	11.0	µg/L	U	R
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	53-70-3	Dibenzo(a,h)anthracene	10.9	µg/L	U	R
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	53-70-3	Dibenzo(a,h)anthracene	10.1	µg/L	U	R
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	53-70-3	Dibenzo(a,h)anthracene	11.4	µg/L	U	R
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	132-64-9	Dibenzofuran	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	132-64-9	Dibenzofuran	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	132-64-9	Dibenzofuran	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	132-64-9	Dibenzofuran	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	132-64-9	Dibenzofuran	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	84-66-2	Diethyl Phthalate	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	84-66-2	Diethyl Phthalate	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	84-66-2	Diethyl Phthalate	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	84-66-2	Diethyl Phthalate	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	84-66-2	Diethyl Phthalate	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	131-11-3	Dimethyl phthalate	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	131-11-3	Dimethyl phthalate	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	131-11-3	Dimethyl phthalate	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	131-11-3	Dimethyl phthalate	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	131-11-3	Dimethyl phthalate	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	84-74-2	Di-n-butyl phthalate	10.9	µg/L		U
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	84-74-2	Di-n-butyl phthalate	11.0	µg/L		U
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	84-74-2	Di-n-butyl phthalate	10.9	µg/L		U
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	84-74-2	Di-n-butyl phthalate	10.1	µg/L		U
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	84-74-2	Di-n-butyl phthalate	11.4	µg/L		U
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	117-84-0	Di-n-octyl phthalate	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	117-84-0	Di-n-octyl phthalate	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	117-84-0	Di-n-octyl phthalate	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	117-84-0	Di-n-octyl phthalate	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	117-84-0	Di-n-octyl phthalate	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	206-44-0	Fluoranthene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	206-44-0	Fluoranthene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	206-44-0	Fluoranthene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	206-44-0	Fluoranthene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	206-44-0	Fluoranthene	11.4	µg/L	U	

Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	86-73-7	Fluorene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	86-73-7	Fluorene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	86-73-7	Fluorene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	86-73-7	Fluorene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	86-73-7	Fluorene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	118-74-1	Hexachlorobenzene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	118-74-1	Hexachlorobenzene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	118-74-1	Hexachlorobenzene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	118-74-1	Hexachlorobenzene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	118-74-1	Hexachlorobenzene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	87-68-3	Hexachlorobutadiene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	87-68-3	Hexachlorobutadiene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	87-68-3	Hexachlorobutadiene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	87-68-3	Hexachlorobutadiene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	87-68-3	Hexachlorobutadiene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	77-47-4	Hexachlorocyclopentadiene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	77-47-4	Hexachlorocyclopentadiene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	77-47-4	Hexachlorocyclopentadiene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	77-47-4	Hexachlorocyclopentadiene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	77-47-4	Hexachlorocyclopentadiene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	67-72-1	Hexachloroethane	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	67-72-1	Hexachloroethane	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	67-72-1	Hexachloroethane	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	67-72-1	Hexachloroethane	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	67-72-1	Hexachloroethane	11.4	µg/L	U	

Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	78-59-1	Isophorone	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	78-59-1	Isophorone	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	78-59-1	Isophorone	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	78-59-1	Isophorone	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	78-59-1	Isophorone	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	91-20-3	Naphthalene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	91-20-3	Naphthalene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	91-20-3	Naphthalene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	91-20-3	Naphthalene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	91-20-3	Naphthalene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	98-95-3	Nitrobenzene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	98-95-3	Nitrobenzene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	98-95-3	Nitrobenzene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	98-95-3	Nitrobenzene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	98-95-3	Nitrobenzene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	62-75-9	n-Nitrosodimethylamine	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	62-75-9	n-Nitrosodimethylamine	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	62-75-9	n-Nitrosodimethylamine	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	62-75-9	n-Nitrosodimethylamine	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	62-75-9	n-Nitrosodimethylamine	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	621-64-7	n-Nitrosodi-n-propylamine	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	621-64-7	n-Nitrosodi-n-propylamine	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	621-64-7	n-Nitrosodi-n-propylamine	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	621-64-7	n-Nitrosodi-n-propylamine	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	621-64-7	n-Nitrosodi-n-propylamine	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	86-30-6	n-Nitrosodiphenylamine	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	86-30-6	n-Nitrosodiphenylamine	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	86-30-6	n-Nitrosodiphenylamine	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	86-30-6	n-Nitrosodiphenylamine	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	86-30-6	n-Nitrosodiphenylamine	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	87-86-5	Pentachlorophenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	87-86-5	Pentachlorophenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	87-86-5	Pentachlorophenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	87-86-5	Pentachlorophenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	87-86-5	Pentachlorophenol	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	85-01-8	Phenanthrene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	85-01-8	Phenanthrene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	85-01-8	Phenanthrene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	85-01-8	Phenanthrene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	85-01-8	Phenanthrene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	108-95-2	Phenol	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	108-95-2	Phenol	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	108-95-2	Phenol	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	108-95-2	Phenol	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	108-95-2	Phenol	11.4	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	129-00-0	Pyrene	11.4	µg/L	U	
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	129-00-0	Pyrene	11.0	µg/L	U	
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	129-00-0	Pyrene	10.9	µg/L	U	
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	129-00-0	Pyrene	10.1	µg/L	U	
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	129-00-0	Pyrene	11.4	µg/L	U	
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	110-86-1	Pyridine	11.4	µg/L	U	UJ
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	110-86-1	Pyridine	11.0	µg/L	U	UJ
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	110-86-1	Pyridine	10.9	µg/L	U	UJ
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	110-86-1	Pyridine	10.1	µg/L	U	UJ
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	110-86-1	Pyridine	11.4	µg/L	U	UJ
CP20030101SV	WM-180 TR-45	0501010-16	SVOC	126-73-8	Tributyl phosphate	12.0	µg/L		
CP20030201SV	WM-180 TR-46	0501010-12	SVOC	126-73-8	Tributyl phosphate	19.2	µg/L		
CP20030301SV	WM-180 TR-47	0501010-07	SVOC	126-73-8	Tributyl phosphate	13.4	µg/L		
CP20030401SV	WM-180 TR-15	0501010-20	SVOC	126-73-8	Tributyl phosphate	12.5	µg/L		
CP20030501SV	WM-180 TR-46	0501029-03	SVOC	126-73-8	Tributyl phosphate	13.5	µg/L		
CP20030101PC	WM-180 TR-45	0501010-17	PCB	12674-11-2	Aroclor 1016	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	12674-11-2	Aroclor 1016	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	12674-11-2	Aroclor 1016	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	12674-11-2	Aroclor 1016	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	12674-11-2	Aroclor 1016	0.53	µg/L	U	
CP20030101PC	WM-180 TR-45	0501010-17	PCB	11104-28-2	Aroclor 1221	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	11104-28-2	Aroclor 1221	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	11104-28-2	Aroclor 1221	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	11104-28-2	Aroclor 1221	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	11104-28-2	Aroclor 1221	0.53	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20030101PC	WM-180 TR-45	0501010-17	PCB	11141-16-5	Aroclor 1232	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	11141-16-5	Aroclor 1232	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	11141-16-5	Aroclor 1232	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	11141-16-5	Aroclor 1232	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	11141-16-5	Aroclor 1232	0.53	µg/L	U	
CP20030101PC	WM-180 TR-45	0501010-17	PCB	53469-21-9	Aroclor 1242	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	53469-21-9	Aroclor 1242	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	53469-21-9	Aroclor 1242	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	53469-21-9	Aroclor 1242	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	53469-21-9	Aroclor 1242	0.53	µg/L	U	
CP20030101PC	WM-180 TR-45	0501010-17	PCB	12672-29-6	Aroclor 1248	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	12672-29-6	Aroclor 1248	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	12672-29-6	Aroclor 1248	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	12672-29-6	Aroclor 1248	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	12672-29-6	Aroclor 1248	0.53	µg/L	U	
CP20030101PC	WM-180 TR-45	0501010-17	PCB	11097-69-1	Aroclor 1254	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	11097-69-1	Aroclor 1254	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	11097-69-1	Aroclor 1254	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	11097-69-1	Aroclor 1254	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	11097-69-1	Aroclor 1254	0.53	µg/L	U	
CP20030101PC	WM-180 TR-45	0501010-17	PCB	11096-82-5	Aroclor 1260	0.53	µg/L	U	
CP20030201PC	WM-180 TR-46	0501010-13	PCB	11096-82-5	Aroclor 1260	0.53	µg/L	U	
CP20030301PC	WM-180 TR-47	0501010-08	PCB	11096-82-5	Aroclor 1260	0.51	µg/L	U	
CP20030401PC	WM-180 TR-15	0501010-21	PCB	11096-82-5	Aroclor 1260	0.56	µg/L	U	
CP20030501PC	WM-180 TR-46	0501029-04	PCB	11096-82-5	Aroclor 1260	0.53	µg/L	U	

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Table H-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
a. Laboratory flags:									
J = Analyte was detected but was less than the quantitation limit.									
U = Analyte was not detected. Quantitation limit is reported.									
b. Validator flags:									
J = Estimated									
R = Rejected									
U = Undetected									
UJ = Undetected estimated value.									
c. This result is considered to be suspect and is deemed to be a false-positive likely due to carry-over. This compound was not detected in a separate injection of this sample.									
d. This result is considered to be suspect because this sample was also analyzed as the matrix spike/matrix spike duplicate analyses. However, this compound was not detected in either the matrix spike/matrix spike duplicate analyses. Phthalates are known laboratory contaminants, and the matrix spike/matrix spike duplicate analyses corroborate that explanation.									



**Appendix I**

**Reported Results for Tank WM-180 Radionuclides**



Table I-1. Reported results for radionuclides.

Field Sample ID	Location	Lab Sample		Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
		ID	Analysis							
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>103</sup> Ru	9.95E+00	pCi/L	3.34E+01	U	1.04E+02	5.20E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>103</sup> Ru	-1.05E+01	pCi/L	3.95E+01	U	1.29E+02	6.45E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>103</sup> Ru	2.07E+01	pCi/L	4.75E+01	U	1.16E+02	5.80E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>103</sup> Ru	-1.39E+01	pCi/L	3.85E+01	U	1.08E+02	5.40E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>103</sup> Ru	-4.24E+00	pCi/L	3.17E+01	U	1.24E+02	6.20E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>106</sup> Ru	2.81E+02	pCi/L	4.35E+02	U	5.98E+02	2.99E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>106</sup> Ru	1.25E+02	pCi/L	2.98E+02	U	7.41E+02	3.71E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>106</sup> Ru	2.09E+02	pCi/L	3.69E+02	U	6.55E+02	3.28E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>106</sup> Ru	3.76E+01	pCi/L	1.75E+02	U	6.09E+02	3.05E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>106</sup> Ru	1.95E+02	pCi/L	3.81E+02	U	7.73E+02	3.87E+02
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>108m</sup> Ag	-8.27E-03	pCi/L	2.68E+01	U	1.04E+02	5.20E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>108m</sup> Ag	6.22E+01	pCi/L	9.42E+01	U	1.29E+02	6.45E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>108m</sup> Ag	8.27E-03	pCi/L	2.90E+01	U	1.13E+02	5.65E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>108m</sup> Ag	8.27E-03	pCi/L	2.74E+01	U	1.07E+02	5.35E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>108m</sup> Ag	8.27E-03	pCi/L	3.45E+01	U	1.34E+02	6.70E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>110m</sup> Ag	-2.23E+00	pCi/L	6.83E+00	U	2.00E+01	1.00E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>110m</sup> Ag	-1.19E+01	pCi/L	1.92E+01	U	2.91E+01	1.46E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>110m</sup> Ag	1.01E+01	pCi/L	1.62E+01	U	2.45E+01	1.23E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>110m</sup> Ag	1.68E+00	pCi/L	6.66E+00	U	2.18E+01	1.09E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>110m</sup> Ag	-9.16E+00	pCi/L	1.69E+01	U	3.17E+01	1.59E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>125</sup> Sb	3.27E+03	pCi/L	2.82E+02		3.09E+02	1.55E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>125</sup> Sb	4.16E+02	pCi/L	5.32E+02	U	4.21E+02	2.11E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>125</sup> Sb	4.19E+03	pCi/L	3.61E+02		3.36E+02	1.68E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>125</sup> Sb	3.56E+03	pCi/L	2.81E+02		3.27E+02	1.64E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>125</sup> Sb	4.98E+03	pCi/L	4.44E+02		3.96E+02	1.98E+02

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>126</sup> Sb <sup>d</sup>	1.13E+03	pCi/L	9.48E+01		1.59E+02	7.95E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>126</sup> Sb <sup>d</sup>	2.29E+03	pCi/L	1.98E+02		1.98E+02	9.90E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>126</sup> Sb <sup>d</sup>	1.91E+03	pCi/L	1.66E+02		1.74E+02	8.70E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>126</sup> Sb <sup>d</sup>	1.34E+03	pCi/L	1.42E+02		1.68E+02	8.40E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>126</sup> Sb <sup>d</sup>	1.89E+03	pCi/L	1.51E+02		1.57E+02	7.85E+01
CP20030101X5	WM-180 TR-45	0501011-06	Specific	<sup>129</sup> I	-2.66E+00	pCi/L	2.49E+00	U	8.41E+00	4.21E+00
CP20030201X5	WM-180 TR-46	0501011-04	Specific	<sup>129</sup> I	2.82E+00	pCi/L	1.47E+00	U	4.80E+00	2.40E+00
CP20030301X5	WM-180 TR-47	0501011-02	Specific	<sup>129</sup> I	2.83E+00	pCi/L	1.12E+00	UJ	3.59E+00	1.80E+00
CP20030401X5	WM-180 TR-15	0501011-08	Specific	<sup>129</sup> I	5.16E+00	pCi/L	1.90E+00	UJ	6.11E+00	3.06E+00
CP20030501X5	WM-180 TR-46	0501030-02	Specific	<sup>129</sup> I	1.51E+00	pCi/L	2.10E+00	U	6.99E+00	3.50E+00
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>134</sup> Cs	-6.44E+01	pCi/L	8.36E+01	U	6.50E+01	3.25E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>134</sup> Cs	9.91E-03	pCi/L	1.76E+01	U	7.20E+01	3.60E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>134</sup> Cs	9.90E-03	pCi/L	1.63E+01	U	6.68E+01	3.34E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>134</sup> Cs <sup>d</sup>	3.34E+02	pCi/L	4.68E+01		7.22E+01	3.61E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>134</sup> Cs <sup>d</sup>	3.28E+02	pCi/L	4.44E+01		7.61E+01	3.81E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>137</sup> Cs	3.26E+05	pCi/L	1.79E+04		6.03E+01	3.02E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>137</sup> Cs	5.02E+05	pCi/L	2.78E+04		9.38E+01	4.69E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>137</sup> Cs	3.85E+05	pCi/L	2.15E+04		8.18E+01	4.09E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>137</sup> Cs	3.48E+05	pCi/L	1.90E+04		6.18E+01	3.09E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>137</sup> Cs	5.45E+05	pCi/L	3.00E+04		9.85E+01	4.93E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>144</sup> Ce	-2.94E+02	pCi/L	4.46E+02	U	5.47E+02	2.74E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>144</sup> Ce	7.78E+01	pCi/L	2.42E+02	U	6.76E+02	3.38E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>144</sup> Ce	8.78E+01	pCi/L	2.34E+02	U	5.97E+02	2.99E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>144</sup> Ce	1.96E+02	pCi/L	3.42E+02	U	5.58E+02	2.79E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>144</sup> Ce	2.21E+02	pCi/L	4.01E+02	U	6.93E+02	3.47E+02

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101X5	WM-180 TR-45	0501011-06	Specific	<sup>14</sup> C	2.76E+01	pCi/L	1.97E+00	UJ	6.15E+00	3.08E+00
CP20030201X5	WM-180 TR-46	0501011-04	Specific	<sup>14</sup> C	1.36E+01	pCi/L	2.29E+00	UJ	7.45E+00	3.73E+00
CP20030301X5	WM-180 TR-47	0501011-02	Specific	<sup>14</sup> C	1.25E+01	pCi/L	2.30E+00	UJ	7.49E+00	3.75E+00
CP20030401X5	WM-180 TR-15	0501011-08	Specific	<sup>14</sup> C	1.17E+01	pCi/L	2.23E+00	UJ	7.28E+00	3.64E+00
CP20030501X5	WM-180 TR-46	0501030-02	Specific	<sup>14</sup> C	1.04E+01	pCi/L	1.94E+00	UJ	6.32E+00	3.16E+00
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>152</sup> Eu	2.64E+01	pCi/L	8.93E+01	U	2.68E+02	1.34E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>152</sup> Eu	-8.53E+00	pCi/L	8.52E+01	U	3.33E+02	1.67E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>152</sup> Eu	-4.66E+01	pCi/L	1.16E+02	U	2.93E+02	1.47E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>152</sup> Eu	-5.09E+01	pCi/L	1.17E+02	U	2.75E+02	1.38E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>152</sup> Eu	8.94E+01	pCi/L	1.74E+02	U	3.46E+02	1.73E+02
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>154</sup> Eu	3.57E+01	pCi/L	4.72E+01	U	3.79E+01	1.90E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>154</sup> Eu	1.15E+02	pCi/L	1.70E+01		4.37E+01	2.19E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>154</sup> Eu	5.97E+01	pCi/L	7.47E+00		3.47E+01	1.74E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>154</sup> Eu	4.03E+01	pCi/L	6.00E+00		2.78E+01	1.39E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>154</sup> Eu	1.45E+02	pCi/L	2.09E+01		4.96E+01	2.48E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>155</sup> Eu	-1.80E+01	pCi/L	9.11E+01	U	3.04E+02	1.52E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>155</sup> Eu	-1.43E+01	pCi/L	1.04E+02	U	3.75E+02	1.88E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>155</sup> Eu	-2.25E+02	pCi/L	3.22E+02	U	3.30E+02	1.65E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>155</sup> Eu	-5.57E+01	pCi/L	1.33E+02	U	3.08E+02	1.54E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>155</sup> Eu	-4.94E+01	pCi/L	1.45E+02	U	3.89E+02	1.95E+02
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>234</sup> U	6.41E+01	pCi/L	2.82E+01	J	4.96E+01	2.48E+01
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>234</sup> U	2.05E+01	pCi/L	2.88E+01	U	3.28E+01	1.64E+01
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>234</sup> U	2.49E+00	pCi/L	3.94E+00	U	3.86E+01	1.93E+01
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>234</sup> U	8.25E+00	pCi/L	1.28E+01	U	4.35E+01	2.18E+01
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>234</sup> U	6.84E+00	pCi/L	1.06E+01	U	4.14E+01	2.07E+01

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>235</sup> U	2.02E+01	pCi/L	3.11E+01	U	8.08E+01	4.04E+01
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>235</sup> U	0.00E+00	pCi/L	0.00E+00	U	1.02E+01	5.10E+00
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>235</sup> U	3.66E+00	pCi/L	5.75E+00	U	3.40E+01	1.70E+01
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>235</sup> U	-2.31E+00	pCi/L	3.72E+00	U	4.11E+01	2.06E+01
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>235</sup> U	4.85E+00	pCi/L	7.56E+00	U	3.32E+01	1.66E+01
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>237</sup> Np	6.86E+01	pCi/L	9.36E+00		1.22E+01	6.10E+00
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>237</sup> Np	1.57E+02	pCi/L	1.56E+01		1.67E+01	8.35E+00
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>237</sup> Np	9.82E+01	pCi/L	1.16E+01		1.34E+01	6.70E+00
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>237</sup> Np	5.69E+01	pCi/L	8.14E+00		8.70E+00	4.35E+00
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>237</sup> Np	1.09E+02	pCi/L	1.32E+01		2.11E+01	1.06E+01
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>238</sup> Pu	2.26E+04	pCi/L	2.63E+03		6.30E+01	3.15E+01
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>238</sup> Pu	3.41E+04	pCi/L	3.88E+03		5.99E+01	3.00E+01
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>238</sup> Pu	2.86E+04	pCi/L	3.37E+03		6.26E+01	3.13E+01
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>238</sup> Pu	2.85E+04	pCi/L	3.36E+03		1.11E+02	5.55E+01
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>238</sup> Pu	4.49E+04	pCi/L	5.15E+03		1.08E+02	5.40E+01
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>238</sup> U	-3.05E+00	pCi/L	5.02E+00	U	3.32E+01	1.66E+01
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>238</sup> U	4.28E-01	pCi/L	6.88E-01	U	2.10E+01	1.05E+01
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>238</sup> U	-4.57E+00	pCi/L	7.55E+00	U	2.96E+01	1.48E+01
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>238</sup> U	1.10E+01	pCi/L	1.60E+01	U	2.00E+01	1.00E+01
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>238</sup> U	4.71E+00	pCi/L	7.36E+00	U	2.48E+01	1.24E+01
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>239/240</sup> Pu	3.45E+03	pCi/L	4.85E+02		8.06E+01	4.03E+01
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>239/240</sup> Pu	5.93E+03	pCi/L	7.79E+02		3.96E+01	1.98E+01
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>239/240</sup> Pu	4.59E+03	pCi/L	6.40E+02		6.02E+01	3.01E+01
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>239/240</sup> Pu	3.85E+03	pCi/L	5.52E+02		6.81E+01	3.41E+01
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>239/240</sup> Pu	8.11E+03	pCi/L	1.06E+03		8.58E+01	4.29E+01

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>241</sup> Am	1.40E+02	pCi/L	3.02E+01		7.88E+00	3.94E+00
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>241</sup> Am	9.67E+02	pCi/L	1.24E+02		8.29E+00	4.15E+00
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>241</sup> Am	1.38E+02	pCi/L	3.04E+01		8.15E+00	4.08E+00
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>241</sup> Am	2.00E+02	pCi/L	4.01E+01		8.86E+00	4.43E+00
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>241</sup> Am	1.95E+02	pCi/L	3.96E+01		8.95E+00	4.48E+00
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>241</sup> Am	4.34E+02	pCi/L	6.01E+02	U	6.36E+02	3.18E+02
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>241</sup> Am	2.16E+02	pCi/L	4.05E+02	U	7.92E+02	3.96E+02
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>241</sup> Am	4.16E+02	pCi/L	5.94E+02	U	6.92E+02	3.46E+02
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>241</sup> Am	2.32E+02	pCi/L	3.90E+02	U	6.49E+02	3.25E+02
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>241</sup> Am	3.91E+02	pCi/L	5.98E+02	U	8.26E+02	4.13E+02
CP20030101X4	WM-180 TR-45	0501011-05	Specific	<sup>241</sup> Pu	2.59E+04	pCi/L	7.52E+02		1.85E+03	9.25E+02
CP20030201X4	WM-180 TR-46	0501011-03	Specific	<sup>241</sup> Pu	4.64E+04	pCi/L	1.34E+03		2.11E+03	1.06E+03
CP20030301X4	WM-180 TR-47	0501011-01	Specific	<sup>241</sup> Pu	3.48E+04	pCi/L	1.01E+03	J	1.70E+03	8.50E+02
CP20030401X4	WM-180 TR-15	0501011-07	Specific	<sup>241</sup> Pu	4.60E+04	pCi/L	1.33E+03		1.87E+03	9.35E+02
CP20030501X4	WM-180 TR-46	0501030-01	Specific	<sup>241</sup> Pu	4.52E+04	pCi/L	1.31E+03		3.64E+03	1.82E+03
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>242</sup> Cm	3.07E+00	pCi/L	4.51E+00	U	8.32E+00	4.16E+00
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>242</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	8.10E+00	4.05E+00
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>242</sup> Cm	6.50E+00	pCi/L	8.63E+00	U	8.81E+00	4.41E+00
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>242</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	8.95E+00	4.48E+00
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>242</sup> Cm <sup>d</sup>	4.28E+01	pCi/L	1.40E+01		7.73E+00	3.87E+00
CP20030101X3	WM-180 TR-45	5AA64	Alpha	<sup>244</sup> Cm	3.71E+01	pCi/L	1.29E+01	J	7.73E+00	3.87E+00
CP20030201X3	WM-180 TR-46	5AA65	Alpha	<sup>244</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	8.32E+00	4.16E+00
CP20030301X3	WM-180 TR-47	5AA66	Alpha	<sup>244</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	8.10E+00	4.05E+00
CP20030401X3	WM-180 TR-15	5AA67	Alpha	<sup>244</sup> Cm	3.58E+01	pCi/L	1.33E+01	J	8.81E+00	4.41E+00
CP20030501X3	WM-180 TR-46	5AA68	Alpha	<sup>244</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	8.95E+00	4.48E+00

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Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101R8	WM-180 TR-45	5AA69	Specific	<sup>3</sup> H	-1.10E+02	pCi/L	8.99E+01	UJ	9.42E+02	4.71E+02
CP20030201R8	WM-180 TR-46	5AA70	Specific	<sup>3</sup> H	-3.04E+02	pCi/L	8.79E+01	UJ	9.37E+02	4.69E+02
CP20030301R8	WM-180 TR-47	5AA71	Specific	<sup>3</sup> H	-2.97E+01	pCi/L	8.88E+01	UJ	9.34E+02	4.67E+02
CP20030401R8	WM-180 TR-15	5AA72	Specific	<sup>3</sup> H	-7.28E+02	pCi/L	8.38E+01	UJ	9.28E+02	4.64E+02
CP20030501R8	WM-180 TR-46	5AA73	Specific	<sup>3</sup> H	-1.44E+02	pCi/L	8.98E+01	UJ	9.43E+02	4.72E+02
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>54</sup> Mn	4.69E-01	pCi/L	3.78E+00	U	1.46E+01	7.30E+00
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>54</sup> Mn	-8.74E-01	pCi/L	5.94E+00	U	2.21E+01	1.11E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>54</sup> Mn	-2.53E+00	pCi/L	6.62E+00	U	1.74E+01	8.70E+00
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>54</sup> Mn	8.44E+00	pCi/L	1.26E+01	U	1.58E+01	7.90E+00
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>54</sup> Mn	-6.80E+00	pCi/L	1.25E+01	U	2.34E+01	1.17E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>58</sup> Co	-6.00E+00	pCi/L	9.94E+00	U	1.56E+01	7.80E+00
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>58</sup> Co	2.98E-01	pCi/L	5.71E+00	U	2.37E+01	1.19E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>58</sup> Co	-2.25E+00	pCi/L	6.79E+00	U	1.93E+01	9.65E+00
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>58</sup> Co	1.33E-02	pCi/L	4.04E+00	U	1.64E+01	8.20E+00
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>58</sup> Co	-2.04E+00	pCi/L	7.69E+00	U	2.42E+01	1.21E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>60</sup> Co	3.64E+00	pCi/L	1.96E+01	U	1.33E+01	6.65E+00
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>60</sup> Co	3.05E+02	pCi/L	2.42E+01		1.48E+01	7.40E+00
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>60</sup> Co	6.35E+00	pCi/L	2.57E+01	U	1.56E+01	7.80E+00
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>60</sup> Co	2.56E+00	pCi/L	1.73E+01	U	1.32E+01	6.60E+00
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>60</sup> Co	5.38E+02	pCi/L	3.84E+01		1.62E+01	8.10E+00
CP20030101X4	WM-180 TR-45	0501011-05	Specific	<sup>63</sup> Ni	7.24E+01	pCi/L	8.11E+00	J	1.78E+01	8.90E+00
CP20030201X4	WM-180 TR-46	0501011-03	Specific	<sup>63</sup> Ni	9.79E+01	pCi/L	1.01E+01	J	1.98E+01	9.90E+00
CP20030301X4	WM-180 TR-47	0501011-01	Specific	<sup>63</sup> Ni	1.02E+02	pCi/L	1.01E+01	J	1.86E+01	9.30E+00
CP20030401X4	WM-180 TR-15	0501011-07	Specific	<sup>63</sup> Ni	7.72E+01	pCi/L	8.59E+00	J	1.87E+01	9.35E+00
CP20030501X4	WM-180 TR-46	0501030-01	Specific	<sup>63</sup> Ni	1.19E+02	pCi/L	1.22E+01		2.42E+01	1.21E+01

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>65</sup> Zn	-3.23E-02	pCi/L	7.10E+00	U	2.69E+01	1.35E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>65</sup> Zn	3.24E-02	pCi/L	9.95E+00	U	4.07E+01	2.04E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>65</sup> Zn	3.24E-02	pCi/L	8.34E+00	U	3.42E+01	1.71E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>65</sup> Zn	-2.91E+01	pCi/L	3.83E+01	U	2.94E+01	1.47E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>65</sup> Zn	3.19E-02	pCi/L	1.07E+01	U	4.37E+01	2.19E+01
CP20030101X4	WM-180 TR-45	0501011-05	Specific	<sup>90</sup> Sr	2.85E+04	pCi/L	2.23E+03		8.89E+02	4.45E+02
CP20030201X4	WM-180 TR-46	0501011-03	Specific	<sup>90</sup> Sr	3.17E+04	pCi/L	2.44E+03		8.64E+02	4.32E+02
CP20030301X4	WM-180 TR-47	0501011-01	Specific	<sup>90</sup> Sr	3.30E+04	pCi/L	2.51E+03		8.36E+02	4.18E+02
CP20030401X4	WM-180 TR-15	0501011-07	Specific	<sup>90</sup> Sr	3.31E+04	pCi/L	2.54E+03		9.02E+02	4.51E+02
CP20030501X4	WM-180 TR-46	0501030-01	Specific	<sup>90</sup> Sr	4.40E+04	pCi/L	3.19E+03		1.63E+02	8.15E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>94</sup> Nb	-1.09E-02	pCi/L	3.95E+00	U	1.62E+01	8.10E+00
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>94</sup> Nb	3.46E+01	pCi/L	3.85E+00		2.46E+01	1.23E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>94</sup> Nb	1.90E+01	pCi/L	2.48E+01	U	1.92E+01	9.60E+00
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>94</sup> Nb	-1.67E+01	pCi/L	2.18E+01	U	1.68E+01	8.40E+00
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>94</sup> Nb	4.67E+01	pCi/L	9.04E+00		2.63E+01	1.32E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>95</sup> Nb	-2.88E+00	pCi/L	6.95E+00	U	1.69E+01	8.45E+00
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>95</sup> Nb	3.17E+00	pCi/L	9.19E+00	U	2.52E+01	1.26E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>95</sup> Nb	7.33E+00	pCi/L	1.26E+01	U	2.10E+01	1.05E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>95</sup> Nb	4.54E+00	pCi/L	8.89E+00	U	1.76E+01	8.80E+00
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>95</sup> Nb	1.27E+01	pCi/L	1.91E+01	U	2.45E+01	1.23E+01
CP20030101X3	WM-180 TR-45	5AA64	Gamma	<sup>95</sup> Zr	1.51E+00	pCi/L	7.93E+00	U	2.87E+01	1.44E+01
CP20030201X3	WM-180 TR-46	5AA65	Gamma	<sup>95</sup> Zr	1.83E+00	pCi/L	1.14E+01	U	4.27E+01	2.14E+01
CP20030301X3	WM-180 TR-47	5AA66	Gamma	<sup>95</sup> Zr	-7.90E+00	pCi/L	1.61E+01	U	3.46E+01	1.73E+01
CP20030401X3	WM-180 TR-15	5AA67	Gamma	<sup>95</sup> Zr	1.51E+01	pCi/L	2.30E+01	U	3.10E+01	1.55E+01
CP20030501X3	WM-180 TR-46	5AA68	Gamma	<sup>95</sup> Zr	1.61E+00	pCi/L	1.14E+01	U	4.36E+01	2.18E+01

Table I-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20030101EA	WM-180 TR-45	5AA74	ICP-MS <sup>f</sup>	<sup>99</sup> Tc	1.69E+02	pCi/L		B <sup>e</sup> , J		
CP20030201EA	WM-180 TR-46	5AA75	ICP-MS	<sup>99</sup> Tc	3.34E+02	pCi/L		J		
CP20030301EA	WM-180 TR-47	5AA76	ICP-MS	<sup>99</sup> Tc	2.46E+02	pCi/L		J		
CP20030401EA	WM-180 TR-15	5AA77	ICP-MS	<sup>99</sup> Tc	1.81E+02	pCi/L		B <sup>e</sup> , J		
CP20030501EA	WM-180 TR-46	5AA78	ICP-MS	<sup>99</sup> Tc	3.91E+02	pCi/L		J		

a. Validator flags:

J = Estimated.

U = Analyte was analyzed for but was not detected.

UJ = Undetected. Estimated value.

b. MDA = Minimum detectable activity.

c. ½ MDA = Used when result reported is not statistically positive.

d. Due to the short half-life and the age of the waste in the tank, the radionuclide is known not to be present and the reported result is considered to be a false-positive. <sup>242</sup>Cm=162.8 days; <sup>126</sup>Sb=12.46 days; <sup>134</sup>Cs=2.06 years.

e. Laboratory flag:

B = Analyte was below the required detection limit but greater than or equal to the instrument detection limit.

f. ICP-MS = Inductively coupled plasma-mass spectroscopy.

## **Appendix J**

### **Reported Results for Metals in WM-180 Sump**



Table J-1. Reported results for metals in WM-180 sump.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7429-90-5	Aluminum	2.07E+03	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-36-0	Antimony	4.72E+01	µg/L	BN	J
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-38-2	Arsenic	4.2E+00	µg/L	U	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-39-3	Barium	4.71E+01	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-41-7	Beryllium	1.0E-01	µg/L	B	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-43-9	Cadmium	5.0E-01	µg/L	B	U
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-70-2	Calcium	1.99E+05	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-47-3	Chromium	1.00E+01	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-48-4	Cobalt	3.2E+00	µg/L	B	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-50-8	Copper	1.71E+01	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-89-6	Iron	2.14E+03	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-92-1	Lead	5.36E+01	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-95-4	Magnesium	7.56E+03	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-96-5	Manganese	6.55E+01	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-97-6	Mercury	6.0E-01	µg/L	B	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7439-98-7	Molybdenum	4.0E+00	µg/L	U	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-02-0	Nickel	1.07E+01	µg/L	B	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-09-7	Potassium	1.51E+04	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7782-49-2	Selenium	3.5E+00	µg/L	U	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-22-4	Silver	2.0E+00	µg/L	U	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-23-5	Sodium	2.05E+04	µg/L		
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-28-0	Thallium	4.4E+00	µg/L	U	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-62-2	Vanadium	4.4E+00	µg/L	B	
CP20020101XM	WM-180 SR-16	4CX46	Inorganics	7440-66-6	Zinc	4.6E+01	µg/L		

Table J-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
a. Laboratory flags:									
B = Analyte was below the required detection limit but greater than or equal to the instrument detection limit									
BN = Analyte was below the required detection limit but greater than or equal to the instrument detection limit, matrix spike/matrix spike duplicate sample recovery was not within the control limits									
U = Analyte was analyzed for but not detected.									
b. Validator flags:									
J = Estimated									
U = Undetected.									

## **Appendix K**

### **Reported Results for pH and Anions in WM-180 Sump**



Table K-1. Reported results for pH and anions in WM-180 sump.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020101AN	WM-180 SR-16	4CX47	Miscellaneous	16887-00-6	Chloride	9.1	mg/L		
CP20020101AN	WM-180 SR-16	4CX47	Miscellaneous	16984-48-8	Fluoride	0.18	mg/L	N	R
CP20020101AN	WM-180 SR-16	4CX47	Miscellaneous	14797-55-8	Nitrate	197	mg-N/L	N	J
CP20020101PH	WM-180 SR-16	4CX48	Miscellaneous	10-29-7	pH	7.5	pH Units		
CP20020101AN	WM-180 SR-16	4CX47	Miscellaneous	*PHOSPHATE	Phosphate	0.01	mg-P/L	UN	UJ
CP20020101AN	WM-180 SR-16	4CX47	Miscellaneous	14808-79-8	Sulfate	38.9	mg/L	N	J

a. Laboratory flags:

N = Matrix spike/matrix spike duplicate sample recovery results were outside control limits

U = The analyte was analyzed for but was not detected

UN = The analyte was analyzed for but was not detected; matrix spike/matrix spike duplicate sample recovery results were outside control limits.

b. Validator flags:

J = Estimated

R = Rejected

UJ = Undetected estimated value.



**Appendix L**

**Reported Results for Organics in WM-180 Sump**



Table L-1. Reported results for volatile organic compounds in WM-180 sump.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020301VG	WM-180 SR-16	0501010-01	VOC	71-55-6	1,1,1-Trichloroethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	79-34-5	1,1,2,2-Tetrachloroethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	79-00-5	1,1,2-Trichloroethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-35-4	1,1-Dichloroethene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	120-82-1	1,2,4-Trichlorobenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	96-12-8	1,2-Dibromo-3-chloropropane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	106-93-4	1,2-Dibromoethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	95-50-1	1,2-Dichlorobenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	78-87-5	1,2-Dichloropropane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	541-73-1	1,3-Dichlorobenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	106-46-7	1,4-Dichlorobenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	78-93-3	2-Butanone	11.5	µg/L		
CP20020301VG	WM-180 SR-16	0501010-01	VOC	591-78-6	2-Hexanone	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	108-10-1	4-Methyl-2-pentanone	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	67-64-1	Acetone	6.7	µg/L	J	J
CP20020301VG	WM-180 SR-16	0501010-01	VOC	71-43-2	Benzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-27-4	Bromodichloromethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-25-2	Bromoform	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	74-83-9	Bromomethane	10.0	µg/L	U	UJ
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-15-0	Carbon disulfide	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	56-23-5	Carbon tetrachloride	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	108-90-7	Chlorobenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-00-3	Chloroethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	67-66-3	Chloroform	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	74-87-3	Chloromethane	10.0	µg/L	U	

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Table L-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020301VG	WM-180 SR-16	0501010-01	VOC	156-59-2	cis-1,2-Dichloroethene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	10061-01-5	cis-1,3-Dichloropropene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	110-82-7	Cyclohexane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	108-94-1	Cyclohexanone	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	124-48-1	Dibromochloromethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-71-8	Dichlorodifluoromethane	10.0	µg/L	U	UJ
CP20020301VG	WM-180 SR-16	0501010-01	VOC	141-78-6	Ethyl acetate	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	100-41-4	Ethylbenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	76-13-1	Freon 113	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	98-82-8	Isopropylbenzene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	13-302-07	m,p-Xylenes	10.0	µg/L	U	
CP20020301VA	WM-180 SR-16	0501010-02	VOC	67-56-1	Methanol	20.0	mg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	79-20-9	Methyl acetate	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	108-87-2	Methyl cyclohexane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-09-2	Methylene Chloride	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	95-47-6	o-Xylene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	100-42-5	Styrene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	127-18-4	Tetrachloroethene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	108-88-3	Toluene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	156-60-5	trans-1,2-Dichloroethene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	10061-02-6	trans-1,3-Dichloropropene	10.0	µg/L	U	UJ
CP20020301VG	WM-180 SR-16	0501010-01	VOC	79-01-6	Trichloroethene	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-69-4	Trichlorofluoromethane	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	75-01-4	Vinyl Chloride	10.0	µg/L	U	
CP20020301VG	WM-180 SR-16	0501010-01	VOC	1330-20-7	Xylene (Total)	10.0	µg/L	U	

Table L-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
a. Laboratory flag:									
U = Analyte was not detected. Quantitation limit is reported.									
b. Validator flags:									
J = Estimated									
UJ = Undetected estimated value.									

Table L-2. Reported results for semivolatile organic compounds in WM-180 sump.

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	92-52-4	1,1'-Biphenyl	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	108-60-1	2,2'-oxybis(1-Chloropropane)	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	95-95-4	2,4,5-Trichlorophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	88-06-2	2,4,6-Trichlorophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	120-83-2	2,4-Dichlorophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	105-67-9	2,4-Dimethylphenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	51-28-5	2,4-Dinitrophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	121-14-2	2,4-Dinitrotoluene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	606-20-2	2,6-Dinitrotoluene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	91-58-7	2-Chloronaphthalene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	95-57-8	2-Chlorophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	91-57-6	2-Methylnaphthalene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	95-48-7	2-Methylphenol (o-Cresol)	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	88-74-4	2-Nitroaniline	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	88-75-5	2-Nitrophenol	1.3	µg/L	J	J
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	91-94-1	3,3'-Dichlorobenzidine	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	99-09-2	3-Nitroaniline	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	534-52-1	4,6-Dinitro-2-methylphenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	101-55-3	4-Bromophenyl phenyl ether	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	59-50-7	4-Chloro-3-methylphenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	106-47-8	4-Chloroaniline	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	7005-72-3	4-Chlorophenyl phenyl ether	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	106-44-5	4-Methylphenol (p-Cresol)	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	100-01-6	4-Nitroaniline	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	100-02-7	4-Nitrophenol	10.9	µg/L	U	R

Table L-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	83-32-9	Acenaphthene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	208-96-8	Acenaphthylene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	98-86-2	Acetophenone	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	120-12-7	Anthracene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	1912-24-9	Atrazine	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	100-52-7	Benzaldehyde	10.9	µg/L	U	UJ
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	56-55-3	Benzo(a)anthracene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	50-32-8	Benzo(a)pyrene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	205-99-2	Benzo(b)fluoranthene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	191-24-2	Benzo(g,h,i)perylene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	207-08-9	Benzo(k)fluoranthene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	111-91-1	bis-(2-chloroethoxy)methane	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	111-44-4	bis-(2-Chloroethyl)ether	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	117-81-7	bis-(2-ethylhexyl)phthalate	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	85-68-7	Butyl benzyl phthalate	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	105-60-2	Caprolactam	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	86-74-8	Carbazole	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	218-01-9	Chrysene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	53-70-3	Dibenzo(a,h)anthracene	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	132-64-9	Dibenzofuran	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	84-66-2	Diethyl Phthalate	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	131-11-3	Dimethyl phthalate	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	84-74-2	Di-n-butyl phthalate	10.9	µg/L		U
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	117-84-0	Di-n-octyl phthalate	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	206-44-0	Fluoranthene	10.9	µg/L	U	

Table L-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	86-73-7	Fluorene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	118-74-1	Hexachlorobenzene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	87-68-3	Hexachlorobutadiene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	77-47-4	Hexachlorocyclopentadiene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	67-72-1	Hexachloroethane	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	193-39-5	Indeno(1,2,3-cd)pyrene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	78-59-1	Isophorone	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	91-20-3	Naphthalene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	98-95-3	Nitrobenzene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	62-75-9	n-Nitrosodimethylamine	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	621-64-7	n-Nitrosodi-n-propylamine	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	86-30-6	n-Nitrosodiphenylamine	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	87-86-5	Pentachlorophenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	85-01-8	Phenanthrene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	108-95-2	Phenol	10.9	µg/L	U	R
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	129-00-0	Pyrene	10.9	µg/L	U	
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	110-86-1	Pyridine	10.9	µg/L	U	UJ
CP20020301SV	WM-180 SR-16	0501010-03	SVOC	126-73-8	Tributyl phosphate	111	µg/L		
CP20020301PC	WM-180 SR-16	0501010-04	PCB	11141-16-5	Aroclor 1232	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	11104-28-2	Aroclor 1221	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	53469-21-9	Aroclor 1242	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	12674-11-2	Aroclor 1016	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	12672-29-6	Aroclor 1248	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	11097-69-1	Aroclor 1254	0.56	µg/L	U	
CP20020301PC	WM-180 SR-16	0501010-04	PCB	11096-82-5	Aroclor 1260	0.56	µg/L	U	

Table L-2. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	CAS Number	Compound	Result	Units	Lab Flag <sup>a</sup>	Validator Flag <sup>b</sup>
a. Laboratory flags:									
J = Analyte was detected but was less than the quantitation limit.									
U = Analyte was not detected. Quantitation limit is reported.									
b. Validator flags:									
J = Estimated									
R = Rejected									
U = Undetected									
UJ = Undetected estimated value.									



**Appendix M**

**Reported Results for Radionuclides in WM-180 Sump**



Table M-1. Reported results for radionuclides.

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>103</sup> Ru	-6.77E+00	pCi/L	1.67E+01	U	4.31E+01	2.16E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>106</sup> Ru	-4.17E+00	pCi/L	7.62E+01	U	3.27E+02	1.64E+02
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>108m</sup> Ag	-2.98E+00	pCi/L	1.37E+01	U	4.77E+01	2.39E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>110m</sup> Ag	-1.13E+01	pCi/L	1.89E+01	U	3.04E+01	1.52E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>125</sup> Sb	-2.56E+00	pCi/L	3.64E+01	U	1.43E+02	7.15E+01
CP20020101X5	WM-180 SR-16	0411041-02	Specific	<sup>129</sup> I	1.08E+02	pCi/L	6.10E+00		3.49E+00	1.75E+00
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>134</sup> Cs	1.19E+00	pCi/L	8.81E+00	U	3.41E+01	1.71E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>137</sup> Cs	1.14E+04	pCi/L	1.05E+03		4.41E+01	2.21E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>144</sup> Ce	-2.24E+01	pCi/L	9.15E+01	U	2.93E+02	1.47E+02
CP20020101X5	WM-180 SR-16	0411041-02	Specific	<sup>14</sup> C	3.26E+01	pCi/L	1.96E+00	J	6.20E+00	3.10E+00
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>152</sup> Eu	1.62E+01	pCi/L	4.78E+01	U	1.34E+02	6.70E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>154</sup> Eu	4.61E+01	pCi/L	6.75E+01	U	7.49E+01	3.75E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>155</sup> Eu	8.67E+01	pCi/L	1.35E+02	U	1.73E+02	8.65E+01
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>234</sup> U	9.88E-01	pCi/L	1.44E+00	U	1.95E+00	9.75E-01
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>235</sup> U	-4.84E-01	pCi/L	8.00E-01	U	2.27E+00	1.14E+00
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>237</sup> Np	-1.08E-01	pCi/L	1.67E-01	U	9.00E-01	4.50E-01
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>238</sup> Pu	1.06E+02	pCi/L	1.41E+01		2.12E+00	1.06E+00
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>238</sup> U	-1.37E-01	pCi/L	2.27E-01	U	9.63E-01	4.82E-01
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>239/240</sup> Pu	1.07E+01	pCi/L	2.37E+00		2.25E+00	1.13E+00
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>241</sup> Am	1.92E+01	pCi/L	3.04E+00	J	1.51E+00	7.55E-01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>241</sup> Am	-4.55E+01	pCi/L	1.20E+02	U	3.03E+02	1.52E+02
CP20020101X4	WM-180 SR-16	0411041-01	Specific	<sup>241</sup> Pu	8.89E+01	pCi/L	2.41E+00	J	3.22E+00	1.61E+00
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>242</sup> Cm	0.00E+00	pCi/L	0.00E+00	U	3.43E-01	1.72E-01
CP20020101X3	WM-180 SR-16	4CX49	Alpha	<sup>244</sup> Cm	1.99E-01	pCi/L	2.98E-01	U	7.28E-01	3.64E-01
CP20020101R8	WM-180 SR-16	4CX50	Specific	<sup>3</sup> H	3.45E+03	pCi/L	4.14E+01	J	4.86E+02	2.43E+02

M-3

Table M-1. (continued).

Field Sample ID	Location	Lab Sample ID	Analysis	Compound	Result	Units	Uncertainty	Validator Flag <sup>a</sup>	MDA <sup>b</sup>	1/2 MDA <sup>c</sup>
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>54</sup> Mn	-5.84E+00	pCi/L	1.12E+01	U	2.23E+01	1.12E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>58</sup> Co	2.70E+00	pCi/L	7.62E+00	U	2.16E+01	1.08E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>60</sup> Co	6.44E+00	pCi/L	1.22E+01	U	2.41E+01	1.21E+01
CP20020101X4	WM-180 SR-16	0411041-01	Specific	<sup>63</sup> Ni	3.72E+01	pCi/L	7.87E+00	J	2.38E+01	1.19E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>65</sup> Zn	1.13E+01	pCi/L	2.23E+01	U	4.65E+01	2.33E+01
CP20020101X4	WM-180 SR-16	0411041-01	Specific	<sup>90</sup> Sr	2.61E+06	pCi/L	1.90E+05		3.02E+04	1.51E+04
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>94</sup> Nb	3.49E-01	pCi/L	5.57E+00	U	2.33E+01	1.17E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>95</sup> Nb	-4.58E+00	pCi/L	9.82E+00	U	2.19E+01	1.10E+01
CP20020101X3	WM-180 SR-16	4CX49	Gamma	<sup>95</sup> Zr	-4.79E+00	pCi/L	1.41E+01	U	4.05E+01	2.03E+01
CP20020101EA	WM-180 SR-16	4CX51	ICP-MS <sup>d</sup>	<sup>99</sup> Tc	5.13E+01	pCi/L				

a. Validator flags:

J = Estimated

U = Analyte was analyzed for but was not detected.

b. MDA = Minimum detectable activity.

c. ½ MDA = Used when result reported is not statistically positive.

d. ICP-MS = Inductively coupled plasma-mass spectroscopy.